SELECTION FROM THE RECORDS

OF THE OFFICE OF THE

FINANCIAL COMMISSIONER, PUNJAB,

Referred to in Paragraph 11 of Financial Commissioner's Circular No. 52 of 1885.

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Papers on the formation of Fuel and Fodder Reserves.

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CIRCULAR No. 16A.

Extract from the Proceedings of the Government of India, in the Revenue and Agricultural Department,—Dated Calcutta, the 1st March 1883.

AGRICULTURE.

Read the following papers annexed as appendices A. to D:—

Extract from the Famine Commission's Report, Part II, Chapter VI, Section 2, paragraphs 8 to 10, page 179.

Extract from Review of the Forest Administration in the several Provinces under the Government of India for the year 1880-81 by the Officiating Inspector-General of Forests, to the Government of India.

Chapter VIII, Page 26, of Manual of the more deadly forms of cattle disease in India, 1871.

Extract from Report on the Forests of Khurdah, Orissa, by J. S. Gamble, Esquire, Officiating Conservator of Forests, Bengal, for the year 1881-82, page 12, paragraphs 44, 45 and 46.

Extract from Appendix A to the above Report, by W. C. Taylor, Esquire, Deputy Collector, on the Khurdah Sub-Division for the year 1872-73.

Extract from the Revenue Administration Report of the North-Western Provinces and Oudh, for 1877-78, Chapter I, Section IV, paragraph 8.

Extract from the Report on the Revenue Administration of the North-Western Provinces and Oudh, for 1880-81, Chapter I, Section IV, paragraph 19.

Extract from a note by Mr. William Crooke, Manager of the Awa Estate under the Court of Wards, dated the 22nd November 1881.

Punjab Revenue Administration Report for 1877-78. Extracts from the Lieutenant-Governor's Review thereof.

Extract from the Punjab Revenue Administration Reports for 1878-79 and 1879-80.

Extract from the Report on the revised Land Revenue Settlement of the Rohtak District, 1873—1879 (pages 76-77).

Extract from Note by the Settlement Officer in the Gurgaon District, dated December 1882.

Letter from the Resident at Hyderabad, to the Deputy Commissioner of Ellichpur (Berar) quoted in the Review of the Inspector-General of Forests on the Forest Administration in the several Provinces of India during 1880-81 (page 11).

Extract from letter No. 143-8—9 (Settlement), dated 22nd December 1880, from the Chief Commissioner, British Burma.

Extract from letter No. 5517, dated 13th April 1881, from the Chief Commissioner, British Burma, paragraph 2.

Report on a visit to the English and Scotch Forests by the Professors and Students from Nancy Forest School, by M. Boppe, Inspector of French Forests.

OBSERVATIONS.—The attention of the Government of India has lately been called by various reports and statistical returns from the Upper Provinces to the growing decrease in the area of grazing lands and wooded tracts in many parts of Upper India. These remarks have special reference to the Provinces of the Punjab, the North-West and the Central Provinces, inclusive of the Berars. The grazing land in these Provinces has not only diminished in area, but has also deteriorated in quality and changed in character, the latter result being partly due, as will be presently explained, to the excessive grazing which the reduction in area has made necessary. The Government of India is aware that efforts have been made both by the Local Governments and district officers, especially in the Punjab, to meet the difficulty; but it appears necessary that more systematic measures and arrangements should be undertaken than have yet been instituted in any Province. The Famine Commissioners have not omitted to give prominent notice to the subject in Part II of their Report quoted in Appendix A.

2. The decrease of the area of culturable waste is a natural consequence of the increasing numbers of the agricultural population, by whom a continually extended area of arable land is required for the plough. The argument indeed has been brought forward that the grazing lands and jungles, of which the cattle of the country have been deprived by the encroachments of agriculture, can be profitably and efficiently replaced by fodder crops, and that such has in fact been the case in many countries in which agriculture is more fully developed. But it is doubtful how far it is wise to allow this argument to be applied at present to the Upper Provinces of India. The one fact that these regions are subject to droughts of a

character unknown in the Western hemisphere, places them on an entirely different footing from those civilised countries with the agricultural system of which we are most familiar. In a season when a failure of the monsoon causes the destruction of crops which supply food for men, those crops also upon which cattle depend are equally liable to perish. It is only in tracts which are thoroughly irrigated that any safe reliance can be placed upon a supply of artificially-raised fodder, or that a system of stall feeding can be expected to preserve the lives of the cattle. Tracts so protected form at the present time a small proportion of the agricultural area of Northern India.

3. The history of the famines and droughts which have occurred during the present century, and especially in late years, is replete with painful accounts of the wholesale destruction of cattle by starvation and the failure of the fodder supply. It may be doubtful whether the loss which the agricultural population has thus sustained has always been fully appreciated. At a time when they have been deprived by a failure of the rains of a great portion of the produce of one or more seasons, they have also had taken from them, in the destruction of their plough-labour, the means of recouping their loss in succeeding years. The late famine of 1877 has furnished many examples of this kind. Accounts have reached the Government of India of the serious deterioration of the agricultural prosperity of many tracts which, there is every reason to believe, would now be in a flourishing condition if the cattle could have been saved. On the other hand, instances have been brought forward in which the existence of a sufficient area of grazing land has, in districts most affected by the drought, both preserved the cattle and secured the agricultural population from prospective loss.

4. It is desirable at this point to explain that the term 'grazing land' as herein used is not to be restricted to land which provides nothing but the ordinary pasture of a grass plain. Such land is often affected just as seriously by a drought as the unirrigated area of cultivated land. Grazing land is here intended to include those wooded tracts and jungles which provide bushes, trees, and herbs from which cattle can obtain a plentiful supply of fodder, even at times when the grass on open ground is dried up and destroyed. There are many trees and many bushes which, drawing upon a supply of moisture below the surface of the earth, can maintain their life and vigour when the shallow-rooted crops and grasses are parched and withered. And this is not all. It has also been ascertained that the grass itself which, on an exposed surface, would succumb to the drought is, in the cooler atmosphere occasioned by the shade and protection of trees and shrubs, saved from destruction.

As, moreover, there is, apart from the question of fodder, a distinct agricultural advantage in maintaining throughout the plains of Upper India a supply of food for fuel and domestic purposes, the term used in the following paragraphs of this Resolution to designate grazing lands will be that of Fuel and Fodder Reserves.

5. A further effect of the absence of proper food after a period of drought is that the cattle, which have been starved for weeks, feed too greedily on the young shoots of the millets that are sown with the first showers of rain or on the coarse grass that springs up on the return of the monsoon. The excess of food to which they have been unaccustomed induces a rapidly fatal disease (described in Appendix B) which has carried off thousands of animals in many parts of India.

6. In Appendix C instances are quoted in which cattle perished in large numbers from want of fodder in the droughts of 1877 and 1880; while, on the other hand, cases are noted in which they were saved by being fed on bushes and leaves of trees. In Rohtak, for example no less than 250,000 beasts are said to have died, or about one-half of the whole cattle of the district. This was in 1877. In 1880, 15,000 cattle are reported to have perished in the district of Jhansi, while many others were only preserved by the bushes in the ravines or by fodder obtained from trees. In the same year large numbers of cattle were in the Allahabad Division kept alive by being taken to the forest tracts of Banda, while throughout the division all the available trees were stripped of their leaves. "There is no need," writes the Commissioner in quoting from his district reports, "to multiply these extracts, all of which tell precisely the same story."

7. The examples to which reference has now been made are sufficient proof of the necessity of taking some action for the protection of the cattle of the country against drought. The facts brought forward seem to prove that at present the agricultural population will not or cannot themselves take sufficient precautions to provide against exceptional occurrences. They trust to accident or to assistance from the Government. But in this matter little or no help can be afforded, unless systematic arrangements are made in advance, and continuously maintained, under which a supply of fodder in a year of drought may be secured. It is necessary, therefore, to consider in what form, system and continuity can be most advantageously established; and it is on this point that the Government of India is mainly desirous of obtaining the advice and co-operation of Local Governments.

The general outlines of the scheme which commends itself to the Government of India as mostly likely to secure the desired results, and which from enquiries already made appears likely to meet with the most general acceptation, will be briefly described in the following paragraphs.

8. The general control and administration of the measures with which this Resolution is concerned should, in the opinion of the Government of India, be primarily in the hands of the local officers, *viz.*, the Commissioner, the District Officer and his subordinates in charge of sub-divisions. The official channel through which the Local Government would communicate with the divisional and district officers would be the Agricultural Department, which would be responsible for providing the Government with advice and information, and for maintaining continuous action. The actual management of the lands set apart for the supply of fodder and fuel would be placed in the hands of Forest officials, who alone can be expected to establish and maintain without interruption a scientific system of treatment.

9. In order to satisfy the above conditions, it would be necessary, in each district or division in which operations are likely to be sufficiently extensive to require scientific management, that an officer of the Forest Department should, when financial circumstances admit of this being done, be placed under the orders of the district or divisional officer. He would work entirely under the orders of the Civil Officer, who would, however, refer questions of a professional or technical character for the advice of the chief Forest Officer of the Province or Circle. In many districts the necessary staff exists already, but in others new posts will have to be created.

It must not, however, be expected that arrangements can be made, financially or otherwise, under which every district or division can, in every part of the Upper Provinces in which the measure would be useful, be supplied with a separate Forest Officer for the work contemplated. It would, indeed, be extremely unwise to enter upon any expensive organization until much more experience and information has been acquired. It is only, therefore, for those regions in which grazing lands are disappearing at a rapid rate, or in which history has shown that drought causes extensive destruction of cattle, that any application for the services of special officials could at present be entertained. It will probably be considered sufficient if at first a Forest official is attached as assistant to the Commissioner in one or two of the divisions in each province in which protection is most required.

10. In the meanwhile the serious duty will devolve upon the district officers of ascertaining how far the cattle need protection, and the extent of land, whether the property of Government or purchasable from land-owners at a reasonable price, which can be made available for Fuel and Fodder Reserves. For this purpose an analysis of every district should be made by the local officials which will show its need for protection against drought, and the extent to which land is available for Fuel and Fodder Reserves. They may also be directed to enquire how land can be most advantageously secured for the required purposes in districts where a sufficient quantity of Government land is not available, how far the landholders themselves or Local Boards will be able to co-operate with the Government in the matter, and at what cost suitable areas can be procured.

11. The Agricultural Department will probably at present be most usefully employed in ascertaining by actual experiment, and in consultation with the Forest Department, what are the best means of bringing waste lands into a condition in which they can most economically provide a supply of fodder in a year of drought, and in what way they can in ordinary years be most profitably employed. The Department would also superintend, in correspondence with Commissioners, the analysis required by the preceding paragraph, and would review for the Local Governments the reports received from each Division. The same Department may also ascertain whether any system of stacking hay or storing fodder can be established, or whether it may not be useful to close grazing reserves for a portion of the year, especially when other fodder, such as the stubble of newly-reaped crops, is available. For if grass reserves are only thrown open when no other food is available, the grass will have the requisite opportunity to make head, and will thus provide a much more ample supply of fodder than if exposed continually to desultory grazing. Enquiries of this kind will fall within the scope of the Agricultural Department.

12. This Resolution is not the place in which the treatment of land required for conversion into Fuel and Fodder Reserves can be considered in any detail. But the opportunity may be taken to give expression to the opinion of the Government of India that little real good can be effected unless the reserves are, at any rate for some years, brought under the control of Government, and systematically protected against the invasion of goats, cattle, and fire. It appears to be a matter susceptible of proof that a protected area will, besides giving security in a year of drought, afford over a certain number of years a con-

siderably larger amount of fodder than an unprotected area of equal extent. It seems probable that the difference is sufficiently great to admit of a hope that Fuel and Fodder Reserves can, in a large number of instances, be made financially successful. The importance of this view deserves some further examination of the question. The following illustrations may therefore be adduced in support of the view which has now been brought forward. In his Administration Report for 1879-80 the Inspector-General of Forests shows in the following words the results of protecting grazing land :—

"In all except the most arid tracts, or where denudation has been complete and of long standing, mere protection, aided by sowing and planting in suitable places, has the effect of gradually clothing the ground with trees and shrubs. What happens is this :—the old stumps and roots in the ground produce shoots ; seeds which have been lying in the soil, and seeds brought by the wind, germinate ; the shoots and seedlings, which without protection would have been destroyed by the fire or eaten by the cattle, grow up ; and wherever there are sufficient remains of the old forest growth in the ground, the result is most remarkable. The difficulty consists in this—that new reserves must be formed, and that, during the first few years, this unavoidably entails some restrictions in the matter of grazing. At first the protection of the areas selected must be absolute, and the people in the vicinity can neither be permitted to burn the grass, nor graze their cattle in these areas. But the grass which grows up abundantly can be cut, and thus furnishes abundant cattle fodder until the forest is sufficiently advanced to admit of grazing."

13. In Ajmir the results of enclosing areas, hitherto barren, with the object of securing fodder for cattle in times of drought, are already remarkable :

"After 5 years' conservation there is much in these forest reserves to encourage us ; the appearance of the hills and country-side in these tracts is quite altered. The people even have begun to recognise the advantage to be obtained by the experiment we have introduced. We have been blessed with another year of plentiful rainfall ; the undergrowth has become in places in Merwara nearly impenetrable, and in the ravines and valleys I have been surprised to see the number of fine young trees springing up. Our great enemy now is fire"—*Ajmir Forest Report*, 1879-80.

Grazing is strictly prohibited, but the villagers are allowed to cut and carry off the grass on pack animals. The cash receipts are at present small, but the benefits which the people indirectly enjoy from these reserves are very considerable.

14. Again, in the North-Western Provinces, various experiments have, for three years been conducted by the Agricultural Department, with the view of reclaiming *usar* or *reh* land, *i.e.*, land rendered more or less unculturable by the excess of salts in the soil. It has been found that the simple expedient of enclosure is more efficacious than any other operation. The natural grasses which, so long as the land is accessible to cattle and goats, are nibbled down as fast as the young shoots appear, spread in the enclosed areas at a rapid rate over the worst land. After two years, experimental cuttings gave a result of 20 maunds of good hay per acre—an outturn which on a square mile would suffice to feed 1,000 cattle for three months, exclusive of the bushes and trees which, there is good reason to believe, can be grown when once the grass is well established.

15. The terrible devastation caused on unprotected land by sheep, and the impossibility of recovering forest and undergrowth once lost so long as the land is exposed to the grazing of sheep is forcibly brought out in a late report by M. Boppe, Inspector of French Forests, on the forests of Scotland, from which extracts are quoted in Appendix D. His remarks on the greater value of land for purposes of grazing after enclosure are, in connection with the suggestions made in paragraphs 11 to 13 of this Resolution, especially deserving of notice. The present barren condition of the greater part of the waste lands of Scotland is attributed by M. Boppe almost entirely to one animal—the sheep. There is very strong ground for believing that the goat, which may be said to take the place of the sheep in India, has been the one chief cause of the present bareness of large tracts of country in Northern India.

Extensive areas now bare are known to have been once covered with a rich growth, if not of forest still of scrub and grass that would, if not destroyed, have formed a rich pasturage ; animals may not have been the original cause of the disappearance of the vegetation, but they have been the constant cause which prevents renewed growth. No more striking instance, indeed, of the effect of the natural recovery which ensues when goats and cattle are excluded can be found than in a comparison between those hills in Ajmir, which have for four years only been enclosed, and those which have remained open to goats and cattle during the same term. The first are covered with an almost impenetrable thicket chiefly composed of shoots edible by cattle. The second are practically devoid of all vegetation, and appear to be mere heaps of rock and stone.

16. If the conclusions indicated by the facts and arguments adduced in the preceding paragraphs can be accepted, the objection which has not unfrequently been brought forward to the occupation of grazing lands on the score of the inconvenience suffered by the adjacent population in being deprived of their cattle pasture is greatly diminished. The occupation is only temporary. The inconvenience which is temporarily occasioned to the agricultural

population is due to their own action in diminishing the efficiency of their grazing lands by an improper use of them. The Government proposes to do no more than restore, and, if possible, to increase the efficiency which has been lost. The measure contemplated will, it is believed, result in a future supply of fodder which will be far larger and far more certain than that of which the owners of the cattle have been deprived. In this view it may be even found desirable to attach for conversion into fuel and fodder reserves, land which has been broken up under the plough, but which as fodder reserves, would be more profitable in preserving cattle from starvation, than in growing, crops which are subject to failure in a year of drought.

ORDER.—Ordered, that the above Resolution be communicated to the Local Governments and Administrations noted in the margin, with a request that the Government of India may be furnished with their views and opinions.

Government of the North-Western Provinces and Oudh.
" " Punjab.
Chief Commissioner of the Central Provinces.
Secretary for Berar to the Resident at Hyderabad.

Ordered also, that copies be forwarded to the Local Governments and Administrations noted in the margin, and to the Home Department for information.

Government of Madras.
" Bombay.
" Bengal.
Chief Commissioner of British Burma.
Chief Commissioner of Assam.
" " Ajmir.
" " Coorg.

(True Extract.)

E. C. BUCK,

Secretary to the Government of India.

Circular No. 53 A./50—3, dated Simla, the 8th May 1885.

From E. C. BUCK, Esquire, C.S., Secretary to the Government of India, Revenue and Agricultural Dept.,

To—The Secretary to the Government of the North-Western Provinces and Oudh,
The Chief Commissioner of the Central Provinces.

IN inviting attention to the Resolution of the Government of India, No. 16A., of the 1st March 1883, I am directed to request that any information on the subject of the establishment of fuel and fodder reserves which may be available may be supplied to the Government of India by the 1st of August next. Although it is improbable that the subject can as yet have been exhaustively dealt with, the Government of India is desirous of circulating such information as may be forthcoming to all Provincial Governments before the ensuing cold season.

2. I am to take this opportunity to observe that the Government of India has reason to believe that too restricted an interpretation has sometimes been placed on the word "fodder" as used in the Resolution in question. The term is intended, as implied in paragraph 4 of the Resolution, to comprise all edible bushes and trees which in years of drought are likely to be of more value than grass and shallow-rooted crops.

Circular No. 53 A./50—3.

COPY forwarded to the Local Governments and Administrations for information.

No. 79 C., dated Lahore, 19th June 1884.

From—R. G. THOMSON, Esquire, Offg. Senior Secretary to Financial Commissioner, Punjab,
To—The Offg. Junior Secretary to Government, Punjab.

I AM now directed by the Financial Commissioner to reply to your letter No. 163 of 7th April 1883, on the subject of the establishment of fuel and fodder reserves.

2. I am to point out that in their letter No. 476 R. of 1st September 1882, the Government of India, in passing orders on the final report of the Rohtak settlement, drew attention to the necessity of adopting effective measures for the establishment of grazing and fodder reserves, and recommended the question to the earnest consideration of the Revenue and Settlement authorities. In communicating these orders to the Financial Commissioner, the Punjab Government in its letter No. 219 of 11th September 1882 desired that the opinion of selected officers might be ascertained as to the feasibility of establishing fodder reserves in the Cis-Sutlej territory, either by actually storing fodder in years of plenty, or by the creation of grass reserves, or by some combination of both these systems.

1. Colonel Grey, Commissioner of Hissar.
2. Colonel Gordon Young, Commissioner of Delhi.
3. Colonel Wace, Commissioner of Settlements and Agriculture.
4. Mr. Purser, Settlement Officer, Jullundur.
5. Mr. Gordon Walker, Settlement Officer, Ludhiána.
6. Mr. Wilson, Settlement Officer, Sirsa.
7. Mr. Ibbetson, Settlement Officer, Karnál.

3. On receipt of these instructions the Financial Commissioner issued letters to the officers marginally noted, asking for an expression of their opinion on this important subject. The replies received are now submitted in original for the consideration of Government. They appear to the Financial Commissioner to display wide practical knowledge and great sobriety of judgment, and, with one exception, they exhibit an essential unity of view. They are, therefore, worthy of very careful attention, and Colonel Davies has found them of great assistance in forming his own conclusions on the larger issues which were subsequently raised.

4. Your letter which is now under reply discussed the feasibility of the creation of fuel and fodder reserves not only in the Cis-Sutlej territory, but throughout the entire Province, and desired the Financial Commissioner to consult with the Commissioner of Settlements and Agriculture in regard to the proposals set forth in the Government of India Circular No. 16 A. of 1st March 1883. Accordingly the Financial Commissioner transferred to Colonel Wace the whole of the correspondence on the previous reference, and requested him to state his views upon the entire question. To this letter Colonel Wace replied on 29th April last in a letter (No. 232), which is now submitted in original for consideration. Colonel Wace apologises for the delay which has occurred in his disposal of the reference; but in Colonel Davies' opinion these apologies are not required. The proposals made by the Government of India would amount to a very serious modification of one branch of the existing rural economy. Such proposals cannot be accepted without attentive and cautious reflection; and if any other justification were needed for delay, it would be amply furnished by the fact that during the past season both the Financial Commissioner and Colonel Wace have been able to study the phenomena of a fodder scarcity in actual existence over considerable areas in the south-east Punjab.

5. Colonel Wace explains that in the Cis-Sutlej country the areas at the disposal of Government are exceedingly small. He further points out the reasons which render it impossible to establish reserves in the so-called farmed villages of Fázilka and Kaithal, and he gives reasons, which appear to the Financial Commissioner to be unanswerable, why Government should not attempt to purchase, or otherwise acquire, land for the creation of grass preserves or fodder farms upon an extensive scale. In all the views stated by Colonel Wace in this connexion the Financial Commissioner thoroughly concurs; and he is compelled to conclude that the establishment of Government fodder reserves is impracticable in the Cis-Sutlej country, where fodder famines are of most frequent occurrence.

6. Colonel Wace has not discussed the question of the feasibility of communal fodder reserves to be established by the villagers themselves. And in truth this subject is beset with difficulties. If we confine ourselves to exhorta-

tion, we practically do nothing. And if we attempt to use measures even of gentle compulsion, we become committed to projects of very doubtful policy, and of some possible danger. The Financial Commissioner has recently submitted to Government some proposals for the introduction into the new Land Revenue Bill of powers to regulate in certain cases the use of some portion of the village common land; and at present he will, therefore, do no more than refer to the letter in which those proposals were submitted. Even if those powers were granted, any action that might be taken under them would have to be tentative, gradual, and cautious. And it is unlikely that they would afford an effective protection to any cosiderablè number of cattle for many years to come. It appears to the Financial Commissioner, however, that such powers would at least indicate the most advisable method of dealing with the problem of fodder famines. The great object to be kept in view is to work not only *for* but *through* the people; and to be very reluctant to adopt measures which will lead these men of sanguine temperament and uncomprehensive intelligence to rely too much upon assistance by authority as a substitute for thrifty foresight.

7. In regard to the purchase or acquisition of land for the creation of fodder reserves, the arguments used by Colonel Wace apply equally to the country on both sides of the Sutlej. And the Financial Commissioner considers that this portion of the scheme should be definitely abandoned In the west Punjab, especially in the Bár country, Government is already in possession of large waste areas owned by itself. But here again the Financial Commissioner agrees with the views expressed by Colonel Wace. The extension of agriculture and the settlement of population are in these parts more important than the formation of fodder reserves. At the same time the Financial Commissioner thinks that as cultivation steadily increases and irrigation develops there will be no objection to, but positive advantage in, taking measures for maintaining a due proportion between arable, forest and pasture lands throughout the Bár country. If this be done, the habits which will gradually develop in the people will probably render it unnecessary to resort to grass or fodder farming or to the actual storage of fodder.

On this subject the Financial Commissioner will have a further opportunity of stating his views when dealing with the memorandum on grazing management drawn up by the Conservator of Forests, and recently circulated to District Officers.

8. The Financial Commissioner therefore concludes—

1st.—That all proposals to purchse or acquire land for Government as grass preserves or fodder farms on a large scale should be negatived. In this direction Government should be content to look at the utmost to its own wants, and should not attempt to insure the people generally against a fodder famine.

2nd.—That small fodder preserves may generally be established by the agency of the people themselves, provided the necessary powers be granted by the new Land Revenue Bill. But in this direction the results to be expected will be very gradual, and for many years on a comparatively small scale.

3rd.—That where Government possesses large waste tracts, which only require irrigation to be culturable, such tracts should not be managed primarily as fodder reserves; but that on the introduction of irrigation into any area the whole question should be

considered and arrangements made for the maintenance of a proper balance between arable, forest and pasture lands. Where irrigation is not introduced, neither grass nor fodder farms are practicable, and the utmost that can be done is to improve the natural growth on such tracts by occasional closure against grazing.

4th.—That in other Government forest lands the question of fodder-supply be further considered along with the memorandum on grazing management by the Conservator of Forests.

No. 65, dated Camp Narel, 27th March 1883.

From—Lieutenant-Colonel H. GREY, C. S. I., Offg Commissioner and Superintendent, Hissar Division,

To—The Senior Secretary to Financial Commissioner, Punjab.

WITH reference to paragraph 3 of your No. 9632 of 20th December 1882, I have to report as follows:—

The only important Government reserves in this Division are three in the Jhajjar tahsíl of the Rohtak District, of which full statistics were given in my No. 9, dated 19th January 1883, and one in the Hánsi tahsíl of the Hissar District, regarding which my No. 32, dated 10th February 1883, forwarded a full report with map furnished by the Deputy Commissioner of Hissar.

There is also, of course, the great Hissar Cattle Farm covering 64 square miles; but with that I have no concern.

2. Of the above, Chuchakwas Bir is the only one in Rohtak of any value for grazing purposes. It contains 3,479 acres at present under reserve. And there are 8,840 acres formerly belonging thereto which have been given away in grants for military services. I attach an extract from the remarks of the Deputy Commissioner, Rohtak, regarding the latter, and fully endorse his views. I have no hesitation in recommending that these grants be resumed, their present money value being given to the holder, or the equivalent in waste lands upon the Rámnagar Canal.

3. Nothing can be done for these Birs in the way of irrigation, except sinking wells in depressions, called jhíls, and cultivating fodder-yielding trees thereon. If the grants are taken up under the Land Acquisition Act, as above recommended, the wells which have been sunk therein should be used for the same purposes. In leasing out the grazing yearly a certain portion might be reserved for hay, and this yearly cut and stacked, the stacks being sold off when three years old.

I have proposed that these Birs shall be assigned to the Local Self-Government Board, and in doing so it might be stipulated that the income shall be devoted to the development of the resources of the Birs as above indicated.

4. The Hánsi Bir is small (2,068 acres), but is capable of great development. Large stores of hay might be raised and stacked therein on irrigation from the canal, and the sale of the old stacks should meet the expenditure on irrigation and otherwise. The Bir should be made over to the Local Board under stipulations to the above effect.

5. In Sirsa there is only a small Bir of some 900 acres immediately around the station; but there are the means of creating, at any rate, one other reserve at the other end of the district. I recently recorded my dissent to the Settlement Officer's proposal for making over 2,432 acres of land resumed from the farmer of Bangar Khera to the proprietors of Muharwála, on the ground that it is a mistake to be anxious to get rid of Government lands, which are daily increasing in value, and which may afterwards be required for various purposes, and then be taken up at great cost.

6. There is also another farm, that of Tahliwála or Odian (No. 83 of Mr. Wilson's list of farm villages), regarding which it is recorded that "if thought desirable a chak of 1,000 acres, nearly all uncultivated, might be cut out of this farm." Mr. Wilson did not recommend this, nor was it proposed by the Settlement Commissioner or ordered by the Financial Commissioner. Nevertheless, in view of the necessity at last recognized of reversing the policy of divesting ourselves of every acre of Government property, it may be deemed expedient to reconsider this matter; and there is doubtless yet time to recover this 1,000 acres of land.

7. I propose that Bangar Khera, 2,432 acres (No. 5 of Mr. Wilson's list), and Tahliwála, 1,000 acres (No. 83 of Mr. Wilson's list), be recorded as Government reserves; and that the Deputy Commissioner be directed to cultivate and stack hay both there and in the Sirsa reserve, selling third year stacks, and paying expenditure by the sale of this hay and the grazing of such portions of the reserves as are not yearly reserved for hay.

8. I have before remarked that I have no concern with the 64 square miles of country under the Hissar Cattle Farm. Nevertheless, on considering the resources of the Hissar District in the case of fodder famine, this great tract cannot be left out of view. I think that the Farm might well be required to permit the district authorities to grow and stack hay on a certain area, say 5,000 acres, to be yearly assigned to them for that purpose.

Extract from a letter No. 101, dated 6th March 1883, from H. W. STEEL, Esquire, Deputy Commissioner of Rohtak, to the Commissioner and Superintendent, Hissar Division.

THESE grants are mostly badly cultivated by tenants, as the recipients were Rájpúts or Afghâns who have no notion of farming. However, the mischief has been done, and I have no remedy to suggest, unless the Government chooses to resume these grants for a money value. In future I would suggest that all such military services might be rewarded, as they are in England, by a grant of cash, when the recipient, if he desires a land investment, can go into the market and make it.

No. 558, dated Delhi, 28th February 1883.

From—Colonel GORDON YOUNG, Commissioner and Superintendent, Delhi Division,

To—The Senior Secretary to the Financial Commissioner, Punjab.

I HAVE the honor to reply to your No. 9636 of the 20th December 1882, as to the desirability and feasibility of establishing grazing or fodder reserves in the Cis-Sutlej Districts of the Province.

2. I think it is a self-evident proposition that, if feasible, there can be no question of the desirability of some system which shall afford the means of sustaining the plough cattle from starvation in tracts chiefly dependent on rain for their agriculture prospects, and amongst a people conspicuous very often for their want of foresight and prudence in the matter of providing in a year of plenty for possible calamity in the future.

3. The question then resolves itself into the feasibility of some arrangement whereby grazing grounds may be preserved to which cattle can be taken when grass fails elsewhere, or by which fodder may be secured and stored in years of plenty to become available in years of drought—a very difficult proposition.

4. His Honor the Lieutenant-Governor has already indicated in his Under-Secretary's No. 219, dated 11th September 1882, that as "the natural growth of grass usually fails exactly at the same time as the crops themselves," it will probably be necessary to look to the storing of fodder rather than to grass preserves to protect the cattle in times of dearth. To this I would add that the necessity for assistance of the description under discussion is hardly likely to be required at the expense or by the agency of the State in tracts favoured by the proximity of a canal, as grass and green crops are almost sure to be produced in quantities sufficient for the requirements of such districts. But though His Honor's remark regarding the liability of grass failing in years when the crops fail in tracts dependent on the rain-fall is true; yet it is still likely that great good might be effected if grass preserves could be acquired and placed under proper management. What would happen I conceive would be something of this sort. The land having been taken up and fenced, would be sown with the best sorts of grass procurable, which would be carefully made into hay and stacked at the proper season: it is easier probably to stack and keep grass in this way than any other kind of fodder, and it improves with keeping, while it is said that in years of drought cattle will eat grass thus preserved more readily and thrive better on it than on almost any stocked food of other sorts.

5. The grass thus stacked would be kept till the prospects of the season which followed had unmistakeably developed themselves, and then, or in the cold season following, would be sold if the year turned out favourable; while, if unfavourable, special arrangements for bringing in the cattle from the neighbourhood would be made and their accommodation arranged for in the lands of the rakh.

6. It would be a matter of no great difficulty to take them in this way and feed them from the accumulated store of hay until nature provided the means of sustenance again in their several villages.

7. The details of such a scheme of course require to be carefully worked out so as to ensure its being conducted with the greatest efficiency and economy at once. It is, however, conceivable that the scheme would really be self-supporting after the land had been once acquired; for a fee would of course be demanded for each head of cattle, or the food afforded be paid for by weight; while, if the dung dropped by the cattle was carefully applied to the soil, the yearly outturn of grass would probably increase and the land itself become so much improved as to render it possible to transfer it to advantage and take up other lands to be similarly dealt with in turns perhaps after five or six years' occupation.

8. How many of these rakhs would be required in each district and of what extent, it is impossible at this moment to say; but within reasonable limits it would be on all hands cheaper and easier to manage efficiently a few large rakhs than a number of small ones; perhaps from 1,000 to 2,000 acres would be an appropriate size to take as an experiment.

9. The land to be taken up must be average land capable of producing good grass; and such land might probably be leased from the common lands of large villages at a very reasonable rate, and its being thus occupied would prevent its being divided off into fractions amongst the village community: in itself no small advantage.

10. In almost all cases it is probable the management of such rakhs might be committed to the zaildár and headmen on the spot, and the arrangement is one which would, I think, recommend itself entirely to the people.

11. I do not think it possible to ensure proper storage of fodder or preservation of grass lands in any other way than directly under some official arrangements. It is not conceivable to me that any amount of argument or persuasion will induce men, who live so much from hand to mouth as the greater number of the agricultural population are accustomed to do, to refrain from supplying themselves and families with bread by the sale of any surplus fodder they may have for the sake of feeding their cattle.

12. The only alternative plan that suggests itself is the purchase every year of bhúsa and fodder crops in each village when these are cheap, and storing them until the next season's prospects are known, and then either getting rid of them at once or doling them out at low rates to those requiring fodder. This system would involve, however, a great deal of trouble and risk, and does not commend itself to me, but it is no doubt feasible.

13. In the Karnál District, however, we have now ready to hand many thousand acres of magnificent grazing land covered with grass and scrub of sorts. These lands are the grazing grounds of the herds on whose produce, whether in the shape of stock or ghi, the prosperity of the villages of the Nardak depends.

14. With the example of the Settlement of 1842 before them, the people have lately cut many more acres of this jungle than they can properly cultivate; and though Major Wace has endeavoured to satisfy them that no further confiscation of such lands is contemplated, cutting is still proceeding. Under these circumstances every effort should be made to save further devastation, and an explicit declaration of what policy it is intended to pursue in assessing these jungles should be announced as early as possible.

15. Probably in this neighbourhood, by judicious arrangements, several chaks of 1,000 to 1,500 acres from the adjoining lands of three or four villages might be demarcated, which Government might offer to take on lease for the term of Settlement with the view of preserving; and while these would afford the supply necessary for the cattle of villages not having grazing lands of their own, it would also set an example to the neighbourhood of how best to conserve such lands for their own use.

16. But to render such rakhs of the use desired, it would be necessary in the case of all of them to select them with the view to the practicability of tank-making. I have just marched through the tract I am speaking of, and find that, while in parts there is a splendidly retentive clay reaching down to a depth of 12 and 15 feet, which holds water like a china bowl almost, the area for the most part has an underlying stratum of yellow earth very near the surface and immediately below which is sand, which if once sapped, will drain off all the water which may be collected in any tank attempted to be dug in such locality.

17. My attention was directed to this by Major Roberts having lately proposed digging a number of vast tanks 25 feet deep each as famine works, and I have satisfied myself that such works will not answer the end they are intended to serve, except where situated in "daber" land, and even then it is hardly to be expected that the clay will in many cases hold out to so great a depth as 25 feet; 10 or 12 or 15 feet would probably be as far as it would be safe to go, and then only after sinking a trial shaft first as Mr. Carleton recommends.

18. But if due attention is paid in selecting the rakhs I speak of, it is probable that sites for four or five tanks of moderate capacity might be found in immediate proxmity to each, so as to be available for watering the cattle taken in to graze until rain fell.

19. To sum up then—

(1). Grazing lands or stocks of stored fodder are not required in districts provided with canal irrigation as Delhi.

(2). In other districts in this neighbourhood, chiefly dependent on rain, I think grass preserves might be maintained with great advantage, such lands being acquired on lease from village common lands.

(3). Such rakhs must possess as a *sine quâ non* facilities for construction of tanks.

(4). In grass preserves thus constituted, cattle would find refuge and food when fodder failed elsewhere, and such preserves might perhaps be made fairly to pay their own expenses if managed through the zemindárs.

(5). The jungle lands of the Kaithal tahsíl should be preserved as much as possible before they are cleared under the apprehensions attendant on the new Settlement.

(6). I do not see how to make a practicable proposal for acquiring and storing fodder other than grass as indicated by Government agency owing to the enormous expense likely to be involved and the difficulties of custody, distribution and the like.

20. In conclusion, I may state that in part of Karnál, notably in Kaithal, the zemindárs do to some extent store fodder for themselves in stacks when a favorable kharíf harvest is secured, and such stores keep good when fairly stacked for five or six years. Any encouragement that could be given to this arrangement would be an advantage; but except by commendation and advice, which is hardly likely to be of much avail, I do not see how to propose to foster the system.

No. 47, dated Lahore, 30th January 1883.

From—Major E. G. Wace, Commissioner of Settlements and Agriculture, Punjab,
To—The Senior Secretary to Financial Commissioner, Punjab.

I have considered carefully the remarks of the Government of India on the recent loss of cattle in the Rohtak District, and on the necessity for providing grazing or fodder reserves as a safeguard against such losses; and have the honor to report as follows.

2. The practicability of storing up food for man in years of plenty was carefully considered by the Famine Commission, in the hope that it might be possible to provide in this way for years of famine. The Commission arrived at the conclusion that it was probably impracticable and certainly impolitic to provide an insurance of this nature (*see* Famine Commission Report, Part I, paragraphs 160—165). Would it be more practicable to provide reserve stores of food for beasts? I have a very strong conviction that it would not.

3. Such reserve stores could be supplied either by cutting hay from uncultivated lands, or by cultivating fodder crops on cultivated land. I would invite attention to paragraphs 42, 43, 66 and 73 to 79 of Mr. Fanshawe's Rohtak Settlement Report. The total number of horned cattle for which we have to provide in Rohtak alone, is 300,000 at the lowest figure. The main fodder crops of the district are joár and bájra, aggregating about 630,000 acres. Of this apparently hardly any is irrigated. Cultivation occupies 80 per cent. of the area; 6 per cent. is barren and 14 per cent. is culturable, but is carefully reserved by the villagers for wood and grazing. None of the waste lands are owned by Government, and this is true not only of Rohtak, but of the adjacent district also with small exceptions. The fodder grown by the agriculturists is not wasted, but very carefully stored.

4. Now, if hay is to be grown on uncultivated land, where is this land to be found? And it clearly could not be grown except by irrigating it. If additional fodder is to be grown in the form of cultivated crops, we shall fail for the same reasons that the agriculturists fail unless the crops are irrigated.

5. It would be possible to state the argument at considerable length, but in whatever manner it is treated it will sum up with a demand for more irrigation. There are two principal methods of protecting man from famine in such tracts, *viz.*, railways and irrigation. But the food of cattle is so bulky that to protect cattle from famine we have to rely on irrigation alone. Nothing short of increased irrigation will provide the desired protection for cattle, and if irrigation is supplied, it is unnecessary for Government to interfere further in the s hape of providing grazing grounds or fodder stores.

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6. The argument may, I think, be carried still further. What is specially required is autumn irrigation. When the cattle die in large numbers, it is because the autumn crops (joár and bájra) fail.

Settlement Report, paragraph 66.

What is required is such a devolopment of the Western Jumna Canal system as shall admit of the irrigation of wide areas of the autumn fodder crops. This development has been repeatedly urged on Government, and the project has, I believe, advanced almost to acceptance. I need not here repeat what I wrote on the subject under the Financial Commissioner's orders at page 176 of the printed Punjab replies to the Famine Commission. A large volume of water goes to waste down the Jumna river in the autumn season. As much as possible of this should be turned into the Western Jumna Canal and distributed over Kaithal and the Hissar Division. When this has been done, the success of the autumn fodder crops will have been insured; and this is the only practicable way of preventing the periodical destruction of half of the cattle by famine.

7. I have no personal knowledge of the Rohtak District, and I should be glad if Mr. Fanshawe were consulted on the subject.

No. 232, dated Lahore, 29th April 1884.

From—Lieut.-Colonel E. G. WACE, Commissioner of Settlements and Agriculture, Punjab,

To—The Offg. Senior Secretary to Financial Commissioner, Punjab.

I HAVE the honor to return the enclosures of paragraph 1 of your No. 4080, dated 2nd May 1883, and to submit the following report on the questions raised by the Government of India's Circular (Revenue and Agriculture Department) No. 16 A. on the subject of fuel and fodder reserves.

Report regarding fuel and fodder reserves.

2. I trust the delay which has occurred before the submission of my reply will not be regarded as mere loss of time. The Government of India's Circular raises questions of the greatest importance to the agriculture of the country, and it proposes to deal with these questions in a manner which is opposed to heitherto accepted opinions and to the experience of the agriculturists themselves. And I was not prepared to say, without some reflection, what course the Punjab Government should follow in the future. My observation of the fodder famine from which the dry parts of Karnál and Umballa are now suffering has assisted me very much in arriving at a definite opinion on the subject, and I may say at once that I have found no reasons for altering the opinions before expressed by me in my No. 47, dated 30th January 1883, to your address—opinions which are identical with those independently expressed by officers of such known judgment and experience as Messrs. Purser, Ibbetson, Walker and Wilson. These officers have lived for years among the agriculturists of the tracts south of the Sutlej, and have a complete knowledge of the local agriculture, having seen it both in good and bad years, and they condemn the Government's suggestions with one voice as unnecessary and impracticable. For my own conclusions I shall give detailed reasons. But by means of the letters of the officers just named it has from the first been strongly brought home to me that both the agriculturists and the few of us who know them well are opposed to the measures suggested in Government's Circular, and I have been consequently compelled to mature my own conclusions with the more caution.

Government's suggestions are considered unnecessary and impracticable.

3. During the past year I have collected statistics of the cattle of each district, and I append a statement giving the result for each district of the Province. In some instances the returns have been made with much care, and on the whole they err rather in the direction of under-stating than over-stating the livestock of the Province. The Famine Commission, in dealing with the question of the storage of grain by Government as a safeguard against famine, observed that the most serious *primâ facie* objection to such a proposal was its cost; that the storage system to be effectual must be continuous; and that the quantity stored must be the maximum that can be required. Obviously the same considerations govern the question of the provision of a reserve food-supply for cattle. It is not necessary to pile up figures for the whole Province. Let us take the Karnál District, of which the kine number is about 400,000. The fodder storage should provide food for 200,000 head for three months, which, at 10 lbs. per head per diem, would amount to 2,250,000 maunds. On the most sanguine estimate 100,000 acres, or 160 square miles of country, would be required for the purpose. It is absolutely impossible to provide such an area. In the first place, it would cost not less than 20 lakhs of rupees, and of this not a tenth can be made available. In the next place, even if funds were provided, it would be impracticable to expropriate the present holders of so large an area. And lastly, the management of such an area would be a matter of the greatest difficulty.

Statistics in regard to cattle.

Famine Commission's Report, Part I, paragraph 160.

The difficulties in the way of promoting a large grazing scheme.

4. These are the three difficulties,—the difficulty of finding the money, the difficulty of finding the land, and the difficulty of managing it when you have it. Money can be found (though with very great difficulty) for railways and canals. We know the conditions under which such works pay. For a big grazing scheme it certainly could not be found. And there are most grave objections to the expropriation of the agriculturists from large areas of land. On these two difficulties I need not dwell; no one of any experience in the administration of the country can be unfamiliar with them. But in the papers before me I see no realization of the very grave difficulties that would accompany the attempt to manage for grazing or for fodder production 100,000, or even 50,000, acres of uncultivated land in an agricultural district. The notion that you have only to fence it or demarcate it and leave it alone will not stand the test of even a small amount of experience. A host of difficulties would spring up in a very short time. The reserves, if really closed, would soon breed a great number of wild animals, which, whether small or great, would be a pest to the neighbourhood. Then, again, if closed, the grass would improve up to a certain point, and after that the timber would gain on the grass. I speak of what I have seen on the Stud Bír at Karnál. Then you would find the number of cattle in the villages adjacent to the reserves increasing very greatly; in fact you would start the reserves for the benefit of the agriculturists at large, and would soon find that there were collecting round them large numbers of cattle in addition to those of the agriculturists at large. In short, the country is far too advanced for us to have any chance of dealing with the fodder question successfully by laying out reserves of uncultivated land. We have to reckon with the existing condition of agriculture, and with a set of agriculturists who are keen to take advantage of every facility that is provided for them. The Forest Department is making some way towards the successful management of waste land, but only slowly, and they have the greatest difficulty in finding an efficient agency and in satisfying the people.

Agriculturists rely rather on the produce of husbandry than on the growth of grass on uncultured land.

5. As regards the assertion that an agriculturist may more safely rely on the growth of grass on uncultivated land than on the produce of his husbandry, I can only say that the agricultural classes persistently act on the contrary belief. They struggle for crops, more crops, and they will not trust to grass. How are we to work against a conviction of this nature? Besides, I believe that these men are quite right. I do not understand on what ground it is asserted that they are careless to store fodder. One of the most remarkable features of the Kaithal Tahsíl and Sirsa District (I name only those tracts of which I have seen much, but it is the case equally in Hissar and Rohtak) are the great stacks of dry cultivated fodder. The fodder grown in a good year often stands four or five years in the stacks till a bad year comes.

Energy and self-help shown by agriculturists in an emergency commended.

6. Then, again, I do not see in the papers before me any adequate expression of the great energy and powers of self-help displayed by these agricultural communities when a bad fodder year comes. I recently marched through Kaithal, Pipli and the Umballa tahsíls, and observed with admiration how much they were doing to meet their fodder trouble. Every agriculturist had his own knowledge of what he could best do; and if you talked quietly to the people, you saw that you could not help them because each man individually was doing his best. They had thought it all out carefully. Some cattle had gone away to friends in more fortunate tracts; other to the Dúns; others to some adjacent irrigated villages to fetch fodder-loads to feed those kept at home. And on the whole nothing struck me more than the great stores of fodder searched out by these industrious people, and the way in which money was forthcoming to pay for it. You found men who had not had a decent harvest for two years or more buying fodder at Rs. 10 a cart-load (20 to 25 maunds).

Stores of fodder in Kaithal, Pipli and Umballa tahsíls accounted for.

7. And where did these stores of fodder come from? From the irrigated villages of the Jumna Canal, and the unirrigated land of the dry country south-west of Ludhiána. A short time later my duties took me to Hoshiárpur, and there I found that large quantities of fodder had gone out of the Jullundur Doáb southwards across the Sutlej. In short, the surplus fodder was found not only in the canal-irrigated villages, but also in the unirrigated lands in the Jullundur Doáb, and in the very dry but notoriously productive agriculture of the Ludhiána and Ferozepore jungle. We are dealing with a sturdy race, who have their own experience and very good foundation for it, and it is hopeless to tell an independent people with experiences of this kind to fall back on grass and grazing reserves.

8. In the submontane tracts, which stretch from Jagádhri on the Jumna to Attock on the Indus, the crops rarely fail, as the rainfall is steady and abundant. Where the rainfall is precarious, two conditions arise,—either the rainfall is so precarious and small that it will not support cultivation; or, though precarious, it is ordinarily sufficient for agriculture. The former condition exists in the Punjab Bár country, which is included for the most part in the Mooltan Division. Here no question arises of making waste reserves. Speaking broadly, the country is all waste, except, where there is irrigation, or in the narrow strips of moist alluvial. The latter condition, *i. e.*, the condition in which rainfall, though limited, is ordinarily sufficient for agriculture, exists between the Sutlej and the Jumna. Here the Sirhind, Western Jumna and Agra Canals now protect a large area.* The whole perennial supply of the Jumna is utilised; but a large volume of water goes to waste in the autumn. If autumn irrigation from the Jumna were developed so as to protect the autumn crops of the west half of the Karnál District and the north half of Hissar, this would effectively secure the agriculture of these parts of the country. There would then remain to protect only certain areas of the Hissar, Rohtak and Gurgaon Districts which cannot be reached by the Jumna and Agra Canals; and of this part of the country I do not know enough to speak with confidence. But every possible extension of irrigation, and every scheme for holding up or utilising the autumn rainfall, should receive the most careful attention. For money spent in well-considered prejects of this nature will always yield a sufficient financial return; and it both enriches the land irrigated and provides a reliable store of fodder over and above the wants of the irrigators.

The two conditions which arise when rainfall is precarious.

* *See* sketch map enclosed.

9. In thus contending for the merits of irrigation as compared with waste reservation, I do not desire to depreciate the good that may result from the proper tending of land unsuited for agriculture, such as the hill-sides in Ajmir or Gurgaon, and salt swamps in the Doábs of the North-West. A report on this subject by the Conservator of Forests is now pending before the Punjab Government. Wherever there is waste land let, its appropriation and management be considered carefully. But where agriculture has established itself it cannot be pushed back; and in the main it can be secured only by wastes.

The merits of irrigation as compared with waste reservation.

10. It remains for me to reply briefly to one or two of the specific inquiries made in Government's No. 163, dated 7th April 1883. The exact area still owned by Government in the Cis-Sutlej districts of the Province is almost *nil*. I invite your attention to the last entry in the return of tenures for 1878-79. There is the Kalesar forest in the Siwáliks of Umballa on the Jumna, area 50 square miles; two small Stud Birs at Karnál and Háusi, and a large cattle farm of 67 square miles at Hissar; scarcely anything else worth mentioning. There were 190,000 acres of so-called farmed estates in Sirsa, and there still are some 70,000 acres held on a similar tenure in Kaithal. But these lands were leased out for cultivation under a covenant that if cultivation was established, the lessees should be confirmed as owners. This confirmation has been given in the case of the Sirsa estates, and will necessarily be given in the case of most of the Kaithal estates. In the latter, we shall do all we can to hold back land from cultivation; but the leases wherever they have been acted up to must be respected.

Reference to specific points noted in the Government letter.

Statement No. 33 of Financial Commissioner's Revenue Report for 1878-79.

Proceedings, Revenue and Agriculture (Revenue) Department, Punjab Government, No. 1, for September 1882.

11. As regards the districts lying west of the Sutlej, I would ask that the remarks made in paragraphs 5 and 8 of my No. 103, dated 21st February last, to your address, may be considered. I append a copy of these paragraphs. In these rainless tracts irrigation interests should have the precedence. Canals should be extended, and as each distributary is made, the land most conveniently situated for cultivation should be given up for that purpose. In these tracts our difficulty is to establish irrigation, cultivation and population; and it will be sufficient to lay down a broad rule that as each distributary is completed a convenient reservation of waste shall be secured. I do not see how any permanent appropriation of waste can be secured in advance of the construction of the canals. The Forest Department should be encouraged in their efforts to do the best with the land in its present state, or to advice the District Officers who have charge of the land. But whenever a canal is brought in all revious arrangements for distribution and management of the waste should be reconsidered.

Lands lying west of the Sutlej.

12. I have refrained in this letter from going into details on questions which are covered by a report on Government forests and waste lands recently submitted to the Punjab Government by the Conservator of Forests, of which, as it has been printed, I presume that copies are available to you.

Questions regarding Government forests and waste lands not dealt with in this report.

Conservator of Forests' No. 1133 of 7th December 1883.

13. I have also refrained from going into such questions as ensilage, the introduction and improvement of fodder crops, and the improvement of the breed of cattle and its protection from disease. As Colonel Davies is aware, I do what I can to forward matters of this kind; and I realise how much can profitably be done in these matters if any funds could be made available for their prosecution. That we can do much without funds and without any organised agency I do not believe.

Other questions which have also been avoided.

List of enclosures.

Statistical statement of live stock in the Punjab.

Letters by Colonel G. Young and Messrs. Purser, Ibbetson, Walker and Wilson.

Map showing roughly how much of the British districts between the Jumna and Sutlej is protected by existing canals.

Copy of notes by Mr. Douie, Settlement Officer, Karnál, dated 2nd June 1883, and 17th April 1884.

Copy of extracts, paragraphs 5 and 8, from Settlement Commissioner's No. 103, dated 21st February 1884.

Reference is also requested to the following papers :—

Mr. Wilson's note appended to summary of agricultural distress issued by Government on 21st March 1884.

Settlement Commissioner's No. 47, dated 25th January 1883.

Statistical Statement showing Live Stock of the Districts of the Punjab.

	Delhi Division.			Hissar Division.			Umballa Division.			Jullundur Division.		
	Delhi.	Gurgaon.	Karnál.	Hissar.	Rohtak.	Sirsa.	Umballa.	Ludhiána.	Simla.	Jullundur.	Hoshiár-pur.	Kángra.
Total area—												
Square Miles	1,270	1,935	2,405	3,470	1,792	3,010	2,576	1,375	82	1,336	2,231	2,483
or Acres	812,100	1,238,231	1,539,200	2,222,568	1,146,993	1,926,130	1,648,607	880,256	52,214	855,186	1,428,250	1,587,265
Area uncultivated, Acres	286,203	348,507	814,279	709,387	245,807	960,831	680,395	155,776	41,008	191,228	720,532	1,108,628
„ cultivated „	525,897	889,724	724,921	1,513,181	901,186	965,299	968,212	724,480	11,206	663,940	707,718	478,637
Area of cultivation that is irrigated, Acres ...	96,314	198,966	146,803	99,546	128,790	33,216	73,377	107,825	702	237,981	11,021	106,124
Population—												
Total souls	456,542	641,848	622,621	503,876	553,609	253,275	1,067,263	618,835	42,945	798,555	901,381	730,845
Souls per square mile, total area ...	360	332	258	145	309	84	415	449	526	591	404	294
„ „ cultivated area ...	556	462	550	213	393	168	705	547	2,453	761	815	977
Stock—												
Cows and bullocks	178,475	233,670	243,811	295,508	198,980	160,818	263,609	250,824	12,399	384,277	385,037	283,439
Buffaloes	51,661	46,996	143,722	50,618	48,090	19,654	94,480	84,619	1,661	67,503	91,575	64,957
Sheep	23,681	24,886	46,832	47,794	18,514	149,621	45,255	67,505	2,311	30,160	21,287	129,394
Goats	45,498	73,989	58,465	69,529	33,917	40,167	59,035		4,033	53,786	114,939	170,666
Horses	2,059	3,627	2,362	2,523	1,758	1,706	3,908	1,159	231	3,227	4,102	1,943
Mules	213	37	977	95	194	...	851	648	210	575	1,016	258
Ponies	1,214	1,783	1,649	2,050	1,798	2,174	2,247	648	137	917	1,612	899
Donkeys	7,873	11,108	16,745	10,566	10,884	1,621	15,118	7,431	91	8,430	4,313	458
Camels	524	870	1,285	17,002	1,918	15,983	236	1,811	...	686	738	69
Pigs	10,824	7,841	18,637	6,245	9,357	...	10,124	221	708	...	1	11
Total stock ...	322,032	404,807	534,555	501,930	325,410	391,744	494,854	414,866	21,781	549,561	624,620	652,094
Number of stock of all kinds per square mile, total area ...	253	209	223	145	182	130	192	301	266	411	279	262
Number of carts	9,914	5,736	3,654	4,630	7,146	1,860	21,459	5,564	14	2,066	2,173	34

Statistical Statement showing Live Stock of the Districts of the Punjab—(continued.)

	Amritsar Division.			Lahore Division.			Rawalpindi Division.				Mooltan Division.			
	Amritsar.	Gurdáspur.	Siálkot.	Lahore.	Ferozepore.	Gujránwála.	Ráwalpindi.	Jhelum.	Gujrát.	Shahpur.	Mooltan.	Jhang.	Montgomery.	Muzaffargarh.
Total area—														
Square Miles	1,573	1,822	1,963	3,513	2,746	2,877	6,217	3,974	1,892	4,701	5,270	5,961	5,574	3,137
or Acres	1.006,621	1,186,258	1,255,944	2,248,375	1,758,017	1,842,007	3,959,025	2,534,748	1,211,203	3,009,107	3,372,496	3,815,027	3,567,750	2,007,819
Area uncultivated, Acres	237,611	281,578	354,143	1,066,964	383,577	1,172,862	3,012,566	1,729,655	484,884	2,450,950	2,664,731	3,485,361	3,161,980	1,609,773
„ cultivated „	769,010	904,680	901,801	1,181,411	1,374,440	669,145	946,459	805,093	726,319	558,157	707,765	329,666	405,770	398,046
Area of cultivation that is irrigated, Acres ...	309,171	122,848	442,308	522,457	238,865	498,018	-20,511	78,093	247,302	233,688	498,371	231,062	292,390	397,996
Population—														
Total souls	893,266	823,695	1,012,148	922,770	631,819	616,892	820,512	582,737	689,315	421,508	534,330	395,296	426,529	338,605
Souls per square mile, total area ...	568	452	516	263	230	214	132	146	364	896	101	66	77	108
„ „ cultivated area ...	743	583	718	500	294	590	555	463	607	49,335	483	768	673	544
Stock—														
Cows and bullocks	142,452	129,870	226,985	193,446	320,387	132,772	566,845	176,661	179,999	272,740	174,415	181,955	243,209	160,630
Buffaloes	60,571	70,192	159,000	45,731	50,387	86,062	82,533	8,625	59,042	40,478	22,052	34,933	40,314	57,817
Sheep	43,942	18,467	2,400	56,799	48,282	51,859	216,500	67,092	44,445	132,830	166,094	171,399	} 424,154 {	89,053
Goats	30,099	30,511	32,261	22,234	34,981	21,621	208,904	106,143	27,491	69 463	175,175	211,570		81,136
Horses	1,689	2,403	4,426	1,808	1,742	1,407	7,172	1,464	2,898	2,826	740	1,620	1,698	4,483
Mules	595	378	250	286	72	126	1,867	1,437	379	321	87	40	133	102
Ponies	995	1,716	1,137	1,476	2,236	626	1,464	942	1,002	1,527	822	162	1,369	1,362
Donkeys	7,785	7,234	3,999	14,810	8,743	4,811	28,004	18,679	7,056	10,860	7,786	3,397	12,034	6,223
Camels	319	182	93	957	2,485	3,058	22,249	4,864	1,486	8,235	8,099	19,534	21,836	3,233
Pigs	55	2,533	180	88	92	27	60	...	...	...	...	...	...	...
Total stock ...	288,602	263,486	430,731	337,635	469,407	302,369	1,135,598	385,907	323,798	539,280	555,270	624,610	744,747	404,039
Number of stock of all kinds per square mile, total area ...	182	142	219	96	171	164	183	97	171	114	105	104	134	129
Number of carts ...	1,875	3,321	1,326	4,797	10,356	782	948	99	636	688	700	22	111	15

Statistical Statement showing Live Stock of the Districts of the Punjab—(concluded).

	Derajat Division.			Peshawar Division.			Total Province.	Value.		Remarks.
	Dera Ismail Khan.	Dera Gházi Khan.	Bannu.	Peshâwar.	Kohât.	Hazára.		Rate per head.	Amount.	
Total area—										
Square Miles	9,296	4,377	3,831	2,504	2,974	2,845	101,012			
or Acres	5,949,620	2,801,280	2,451,944	1,602,511	1,903,637	1,821,010	64,641,381			
Area uncultivated, Acres	543,609	1,793,280	1,869,596	738,006	1,593,575	1,418,938	40,916,220			
„ cultivated „	806,011	1,008,000	582,348	864,505	310,062	402,072	23,725,161			
Area of cultivation that is irrigated, Acres ...	370,579	438,205	113,972	181,572	36,340	35,761	6,550,134			
Population—										
Total souls	441,649	363,364	332,577	660,594	181,540	381,489	18,662,230			
Souls per square mile, total area	48	83	87	264	61	134	180			
„ „ cultivated area ...	351	231	365	488	354	607	503			
Stock—								Rs.	Rs.	
Cows and bullocks	234,842	72,150	117,425	227,237	90,306	162,151	6,897,385	20	13,79,47,700	
Buffaloes	23,787	5,187	7,400	29,553	8,533	28,022	1,685,855	20	3,37,17,100	
Sheep	323,539	27,296	34,534	77,301	48,855	42,855	2,694,936 }	2	{ 53,89,872	
Goats	161,769	64,450	34,774	47,713	57,282	142,744	2,284,345 }		{ 45,68,690	
Horses	4,561	3,869	2,453	3,355	1,146	2,336	82,701	150	1,24,05,150	
Mules	50	68	67	291	85	1,546	13,254	70	9,27,780	
Ponies	911	647	613	914	...	1,460	38,509	20	7,70,180	
Donkeys	11,119	5,530	24,474	15,178	3,735	5,628	301,723	10	30,17,230	
Camels	14,720	8,497	14,060	2,010	3,380	286	180,705	40	72,28,200	
Pigs	...	...	...	...	...	...	67,014	5	3,35,070	
Total stock ...	775,298	187,694	235,800	403,552	213,322	387,028	14,246,427	...	20,63,06,972	
Number of stock of all kinds per square mile, total area	83	43	62	161	72	136	141	...	...	
Number of Carts	18	75	12	179	11	6	90,227	...	...	

No. 9, dated Jullundur, 5th January 1883.

From—W. E. PURSER, Esquire, Settlement Officer, Jullundur,
To—The Senior Secretary to Financial Commissioner, Punjab.

I HAVE the honor to reply to your No. 9638, dated 20th ultimo, concerning the desirability and feasibility of establishing some system of grazing or fodder reserves in the Cis-Sutlej districts of the Province. I can speak only of part of Hissár Division.

2. In my opinion nothing can be done in this matter. It is evident that grazing preserves are quite out of the question unless canal water is supplied; and even if Government were to buy up the enormous area required to feed the cattle of the districts concerned, and were to supply canal water, in nine years out of ten there would be no remunerative demand for the grass. The same remark applies if other fodder crops were grown instead of grass. It would hardly do to grow other crops usually and fodder only in seasons of drought, because it is not till too late to put down autumn crops that it becomes known whether there will be fodder famine or not; and for fodder the spring crops are of very inferior importance to the autumn crops in the Cis-Sutlej districts, and would hardly save any appreciable number of cattle, especially as the cattle begin to die before the spring crops are fit to cut.

3. As to storing fodder, there are just the same objections to it as to storing grain. Human lives are at least as valuable as those of cattle, yet Government does not store grain for the people, and I do not see why it should store fodder for them.

4. The people themselves are not likely to do anything. They will not grow inferior fodder crops in the canal villages beyond their own needs; while in the rain-land tracts the fodder crops fail as well as the grass in seasons of drought. As to storing fodder, the people do so already. Failure of crops for want of rain is nothing new to them, and if they do not store enough fodder to tide over two years, it is probably because they find it pays better not to do so. They are shrewd enough to make provisions for partial failure of the crops, and, if it were worth the cost, would do so for a total and prolonged failure. Let us suppose that they need a store of fodder sufficient for two years. Then every year they would have to feed their cattle on old fodder and replace it by new fodder, which would probably result in deterioration in the breed of cattle, and would certainly be followed by a falling-off in their value as milk-producers, or else they would have to keep the old crop till a drought occurred. But before then it would constantly happen that the store of fodder had become unfit for food. Fodder, even in this country, will not keep for ever. The people might then lose several fodder crops before the stores were needed to save the cattle, and the value of the lost crops might be greater than of the saved cattle.

5. I do not wish to underrate the loss to the people from the enormous mortality that takes place every now and then among their cattle. But the loss may be easily exaggerated. The Cis-Sutlej districts are mostly dependent on rain for their crops; and in such tracts it is clear the loss of cattle does not mean what it would in a country where artificial irrigation from wells is extensively practised. In the latter, a great mortality of cattle would be followed by a proportionate reduction in irrigated cultivation. In the former, the cultivated area after a drought like that of 1877-78 is very little less than usual. The cultivation may be more rough, but, owing to the previous forced fallow, the increased productive powers of the soil probably make up for the inferior tillage.

6. I do not think any direct action by Government is feasible or advisable; and, if the people have not themselves seen fit hitherto to store enough fodder to save their cattle at all times from starvation, they are not at all likely to do so in future, as they have probably learned from experience that it does not pay.

No. 17, dated 9th April 1883.

From—T. GORDON WALKER, Esquire, Settlement Officer, Ludhiána,
To—The Senior Secretary to Financial Commissioner, Punjab.

I HAVE the honor to reply to your No. 9639, dated 20th December 1882, on the subject of grazing and fodder reserves, that, so far as this district is concerned, I can see no possibility of taking measures towards their establishment. What waste land there was has to a great extent disappeared within the last 30 years; and there is very little now left except in the tract along the river (Bet) and in some villages to the south-west. The arable waste does not amount to more than 10 per cent. of the whole area; and if we exclude that in the Bet and the Bírs or reserves of the Malaudh jágírs, the proportion is much less. There is likely to be a further extension of cultivation within the next few years.

2. The district depends mostly for its supply of cattle on the country lying to the south of it. In fact it is much too fertile for cattle breeding; and it is not likely that the price of cattle will ever be so high relatively to the price of grain that it should be found profitable to throw cultivation into pasture. On the contrary, it is likely that year by year the proportion of cattle imported to those bred in the district will increase. The present value of the annual yield of an acre of cultivated land is nowhere less than Rs. 10, and though there was a considerable loss of cattle after the drought of 1862 and 1868, this, when distributed over a number of years, does not amount to much annually.

3. The result of the failure of rain in these years appears to have been this. In the south-west portion of the district, where there is little or no well irrigation, the want of fodder had the effect of making the people sell their cattle—often at a merely nominal price—to save them from starvation. But it is a very common practice in those parts to buy cattle just before the autumn sowings and to sell them when the rabi is in the ground. A great number of cattle pass through the hands of the agriculturists in this way annually, being bought up by them in Sirsa, Hissar, &c., used for a few months, and then taken on across the Sutlej, and disposed of at a profit. There is a considerable trade in cattle of this description, and the first result of a failure of fodder in these parts is to stimulate it. If the failure is general through the Province, there are no purchases, the cattle are sold cheaply at first, and finally cease to have any value. I am told that valuable draught cattle are actually given away in numbers in the years referred to in order to save them from starvation.

In the more highly cultivated parts of the district a drought has the result of making the work at the wells much more constant and trying. The cattle are fed; they must have their grain even though the cultivator's family be starving, for every thing depends on them. But the extra work and the want of fodder tells on them, and they gradually sicken and die.

4. The loss of cattle suffered in the years mentioned, which appear to be the only two years of real drought that the district has had in the last 30, does not appear to have crippled the resources of the people. The purchase of new cattle in place of those lost will in many cases be found to be the origin of a load of debt of which the cultivator has never been able to get rid of; but, as a rule, the Jat population who inhabit the tracts most liable to suffer in this way are thrifty enough to reserve either cash, jewelry or grain sufficient to enable them to pay for the cattle required: but perhaps if more trying seasons with prolonged drought should come, the same power of recovery will not be found. The Muhammadans of the Bet are not liable to suffer in this way for several reasons.

5. I think, then, that nothing is likely to be done in this district in the way of establishing fodder reserves. It might be possible to make some proposals if there were any waste land belonging to Government; but it would lead to no gain, and, I think, a good deal of material loss if we were to attempt to check the spread of cultivation. Nor do I see how we could provide for the reservation of such plots of waste as now exist in some villages. Something might be done in some of the lower villages by irrigating such waste as there is from the Sirhind Canal in a bad year. But the result of the opening of the canal is likely to be the complete disappearance of all waste. In fact, it will always pay the cultivators better to take their chance of occasional loss. I think that much might be done in the way of assisting the people after a drought by means of advances for the purchases of cattle; but this is a separate subject, and I need not refer to it here.

6. I fear that my experience of the Province is too small to enable me to express an opinion as to whether it is possible to establish reserves in those districts whence the cattle supply comes. I can make no useful suggestions on the subject.

7. As to storage of fodder, the argument against this is the same as that against checking the extension of cultivation. The amount of fodder crops grown is never more than sufficient for the year's consumption; generally less; and the loss of cattle has not hitherto been so heavy as to make it profitable to cover more cultivation with fodder crops.

On the whole, I think that the agriculturists may safely be trusted to do what is for their own interest in this matter. If it is possible to keep Government waste land near a canal as a reserve, I should be in favour of doing so. The subject is a very important one, and I have had little time to consider it. I have merely noted in this letter the points that occur to me in respect of this district.

No. 7, dated Gurgaon, 12th March 1883.

From—J. WILSON, Esquire, Settlement Officer, Gurgaon,

To—The Senior Secretary to Financial Commissioner, Punjab.

IN compliance with your No. 9640, dated 28th December 1882, calling for an opinion as to the desirability and feasibility of establishing some system of grazing or fodder reserves in the Cis-Sutlej districts of the Province, I have the honor to state that the question had

already engrossed my attention in the Gurgaon and Sirsa Districts, both of which have suffered very serious losses of cattle in years of drought. In the latter district, Mr. Oliver, formerly Deputy Commissioner, who knew it well, had often in his reports expressed an opinion that the prairie land was being broken up too rapidly, and had urged that steps should be taken to check the spread of cultivation in the more advanced parts of the district, and to reserve a large area in each village as a grazing ground for the cattle. Again, Mr. Wakefield, in reporting on the farm villages in the Sirsa District, had recommended that plots of land aggregating 33,000 acres should be resumed by Government and reserved as grazing ground, and I had to consider this proposal in submitting my report on those villages. At first I was inclined to adopt the opinions of these experienced officers, but in the drought of 1880, which caused a fodder famine in the district and raised the prices of fodder as high as the prices at which grain had been selling a few years before, I saw that it would be useless to attempt by a system of grass reserves to provide against a famine of fodder, for the extensive grass waste which still occupy almost half the area of the district produced almost no grass at all that year, and gave almost no aid towards the preservation of the cattle. There can be no doubt that this happens in all years of drought. Indeed, far from endorsing Mr. Oliver's opinion, I believe that cultivation up to a certain limit, not yet nearly reached in Sirsa, actually increases the produce of fodder, especially of storable fodder, and thus improves the capacity of the district for the preservation of its cattle in years of drought. In the dry tracts of Sirsa, barley and jowár straw, the leaves of *moth* and the grain of gwár, &c., form a valuable fodder, and wheat and bájra straw, though not so good, are eaten by the cattle and suffice to keep them alive. The average produce of straw on unirrigated lands may be taken as 5 maunds per acre, which is much more than the storable produce of grass on the same land when uncultivated; and even in the year of drought when the grass wastes produced almost nothing, the cultivated land was estimated to have produced from 2 to 3 maunds of fodder per acre. It is noticeable also that in Sirsa *pálá* (the leaves of the *jharberi*), which is considered one of the best fodders, grows much more plentifully on cultivated than on uncultivated land. It is then useless to attempt to provide against a fodder famine by simply setting apart plots of land to be preserved from cultivation; and one of the strongest proofs of this is given by the Hissar Cattle Farm, where a very large area of good grass land is strictly preserved for the pasture of the cattle of the farm, and yet in the drought of 1877-78 the proportion of the cattle belonging to the farm which died from starvation was almost as large as in the neighbouring villages which had no such grass reserves. It is true that the cattle of a village should not be wholly dependent upon dry fodder; and most villages show that they recognise this by setting apart a certain portion of the area which is kept sacred from the plough that the cattle may pasture on it; and in Sirsa, where land is still plentiful, individual owners or tenants often set apart a field or two of their own for this purpose. The point often arises in partition cases, and usually in the Sirsa District a large portion of the area is kept common to the whole village or sub-division of the village as a pasture ground, the remainder only being divided among the owners applying for partition. Often the proprietors are anxious to have this divided also, that they may have the power of enclosing their share or bringing it under the plough; but I am of opinion that the Deputy Commissioner, when making the partition, should ordinarily insist upon the reservation of a common of this description in the interest of the non-proprietors resident in the village who have an ill-defined customary right to pasture their cattle in the waste, and should discourage by every means in his power the enclosing or breaking up of such common pasture land. These grazing grounds, however, are more for the convenience of the peasants in ordinary seasons than a protection against drought. Another instance in support of this view is given by the drought of 1880-81. In that year the vast prairies of Bíkaner, to which in ordinary years great numbers of cattle from as far north as Ludhiána are driven for pasture, produced no grass, and no cattle were sent there even from the Sirsa District close by, where a fodder famine was prevalent. I am then of opinion that, while it is advantageous in all seasons for a village in the Cis-Sutlej districts to have a certain area of village common set apart for grazing and strictly kept from the plough, it is useless to establish grazing preserves as a protection against drought. It was partly for this reason, partly because of the difficulty of arranging for the protection of a large number of small areas, and also because it seemed unfair to the lessees of the farmed villages, that I dissented from Mr. Wakefield's proposal to resume a large portion of the area of these villages for grazing reserves; the Punjab Government adopted my view and made no such reservation in granting proprietary rights in the farms to the lessees.

2. It is then only by improving the methods of storing fodder that the cattle can be more effectually protected from starvation in seasons of drought. In the Sirsa and Gurgaon districts considerable efforts are already made by the people to store up fodder for their cattle. Some crops, such as turnips, *chari*, *gwár* and *moth* are cultivated almost solely for the fodder they produce, and care is taken to gather and store not only their produce, but the straw of barley, wheat, jowár and even *bájra*, stacks of which may be seen standing in the fields and

about the homestead of almost every village. The *púla* or leaves of the *beri* are also carefully stored, and some of the better grasses are often cut and stacked for hay. There seems to be some reason for believing that greater care is taken than formerly to store fodder in these ways and preserve it for seasons of drought, and probably the experience of the last two or three droughts has taught the people to use every available means of storing fodder against such seasons. But, as a rule, all that they can do is to store up a quantity sufficient to support their cattle during the dry months of the hot weather when there is no green food available, and the cattle have to be supported wholly on the stored fodder which gets exhausted towards the end of June; and if the rains then fail and no grass springs up, the cattle are left without food. Should any plan be discovered and brought into general use whereby a larger quantity of fodder could be stored, it is more than likely that the cattle-owners of the Cis-Sutlej plains would simply increase their stock of cattle up to the number which could be supported by the increased amount of fodder till the rainy season, and, as hitherto, take their chance of the rains. These districts are all cattle-breeding districts, and have always more cattle than are required for their own agriculture, as may be seen from the large number of young bullocks annually sold at the cattle fairs of the Hissar Division. If the number of cattle bred in that tract were kept more nearly down to the number required for agriculture, the present amount of fodder would be sufficient to preserve a larger proportion of them; and the fact that the cattle-owners of those districts constantly allow their cattle to multiply up to the means of subsistence and trust to the periodical rains not to fail, seems to prove that it is to their interest in the long run to do so rather than to keep down the number of their stock and store up more of the available fodder.

3. It would not be expedient that Government should purchase and store fodder to be sold to the cattle-owners when their own stocks were exhausted. Fodder in generally so bulky that it cannot be conveyed long distances except at a prohibitive cost; yet the extension of railways and navigable canals and the improvement of roads no doubt have a great effect in bringing a larger area within reach of places where even in seasons of drought there is fodder to spare. The Rewári-Ferozepore Railway and the Sirhind Canal will thus protect the cattle as well as the population of this tract from starvation. Any new plan which could be devised by which the green fodder which is so plentiful everywhere during the rainy season could be preserved in its nutritious state until the hot weather and on into the following year would no doubt be a further aid towards the preservation of the cattle. I believe that several plans have been tried on the Hissar Cattle Farm for the storing of fodder, and no doubt experience there has shown the methods best suited for the purpose in that tract of country. Should any of these methods appear likely to make their way among the people, they might be encouraged to adopt them; but I cannot from my own knowledge suggest any special manner in which Government can take action so as to protect the cattle of these districts from severe drought. Probably whatever improvements be effected, the cattle will be allowed to multiply up to the means of subsistence in ordinary seasons, and when a sudden drought deprives them of the expected fresh supply of fodder, they will die in large numbers as they always have done.

Note by J. M. DOUIE, Esquire, Settlement Officer, Karnal-Umballa, dated 2nd June 1883.

As regards waste lands in the Nardak and Kaithal, I have made it the practice to return to petitioners all petitions asking for waste lands lying uncultivated within the areas of existing mauzas. This must have reassured the people. The Superintendent has also let it be known that our policy is not to extend cultivation indiscriminately. After another cold weather's camping I shall really be able to say whether much can be done to check the breaking up of the waste. I fancy in most Ját Kaithal villages in Pargana Kutháná there is little waste left to break up. The enormous difference between Ibbetson's figures for kharíf cultivation in his report on the tract and the figures of our kharíf girdáwari in Kaithal was very striking, so much so, that I sent back the Superintendent's statement and asked if it was really correct. Speaking from recollection, I think our area was 198,000 acres, and Ibbetson's (a five years' average including several bad years) about 120,000 acres. Of course Ibbetson's figures were founded on very bad girdáwarís, but the Superintendent said that one reason of the discrepancy was that people had been breaking up land thinking cultivating possession of common land would very likely be recorded as ownership. There is no doubt there was a great rush to break up land in consequence of the settlement. I do what I can in partition proceedings to reserve waste in sufficient quantity.

Note by J. M. DOUIE, Esquire, Settlement Officer, Karnál-Umballa, dated 17th April 1884.

THANKS for the printed papers on the agricultural distress, which I return. I have been marching through Kaithal. There are almost literally no crops, but the people are not in bad heart, though there is some distress among the kamíns and the smaller zemindárs.

I heard of one case of 80 proprietors (all the people of one caste in a village) going off in a body in the night. It was a village in which we did not suspend. Our suspensions were not too large. Without them the people would have started without credit or money. I should be more liberal if I had to consider the matter again. As regards the rabi, nearly the whole of the kist will have to be suspended in the Bangar and Nardak and Naili Chaks of Kaithal. The same applies to the Nardak of Indri, and we shall have to allow considerable suspensions in the Indri Bangar, and to some extent in the Khadir too. The south of Kaithal is emptied of a great part of its population. A great many of the cattle are always driven away in March from the Bangar and Nardak, the Játs' cattle going mostly to the Naili villages in Pihewa and Kaithal, and the Rájputs' cattle to Pánipat and across the Jumna into Sahāranpur and Muzaffarnagar, where they get free grazing from their Sogárs or marriage relations. But this year a great many of the cattle have been driven off to the hills about Dehra Dún and Hardwár, and more would have gone if the cattle had had strength for the journey, or the people money to pay the grazing fees levied there by the land-owners. The cattle will come back as usual in the latter part of May if rain falls. A great many will never return, for the hill climate does not suit Bangar cattle; and the zemindárs have always told me that in 1877-78, when so many cattle were driven to the hills, a very large number did not return. Tanks are being dug in Kaithal; but the rate of pay is very low; and the amount of excavation demanded too large for ill-fed people. That is, they cannot earn enough to induce them to work or to make it worth their while to do so. I have sent proposals to Bulman for a number of tanks to cost Rs. 12,000 or so in Thanesar. Another bad harvest would be a terrible calamity, and real relief works would become a necessity; but I think appearances are against that occurring. Don't the meteorologists say that a year when the snow-fall is small in the hills means a season of heavy rain-fall in the plains? If we got good rain we should have a bumper harvest in Kaithal, for the land has had a long enforced rest. I wish the canal people would dig the Rambha and Dachour rájbahas even though they may not be able to give a supply for the kharíf for a year or two. It would provide lots of work just where it is required.

Extract paragraphs 5 and 8 from a letter No. 103, dated 21st February 1884 from Lieutenant-Colonel E. G. WACE, Commissioner of Settlements and Agriculture, Punjab, to the Senior Secretary to Financial Commissioner, Punjab.

PARA. 5. The next step should be to give away some land in grants; but certainly not more than a moiety of what each distributary commands. When the first grantees have established themselves, the value of the unassigned lands adjacent to them will have risen enormously. The tendency at first starting will be for a rush to all the best land. If it is yielded to, Government will be parting with all its land at the lowest price; and the first settlers, who ten years hence will want to expand again, will not be able to expand. The true policy will be to encourage the Canal Engineers to push on their distributaries, and to settle at first a portion only of the land commanded by each distributary.

8. In regard to the reserving of a sufficient area as fodder reserves for seasons of drought, if the proposal made by me in paragraph 5 is acted on, this question will hardly arise. I will reply almost immediately to your letter on the general question of fodder reserves. But, in anticipation of what I shall then write, it may be convenient if I say here that fodder reserves are unnecessary where canal irrigation is secure. The fodder difficulty in seasons of drought is not created by the insufficiency of the fodder supplied by successful husbandry: on the contrary, where the agriculture of the country is successful and secure, it feeds abundantly both man and beast. The fodder difficulty arises when agriculture is insecure. Irrigation removes this insecurity; and the only necessity that then remains is the provision of certain areas for the production of timber.

No. 78, dated 28th March 1883.

From—DENZIL IBBETSON, Esquire, Editor, Punjab Gazetteer, Lahore,

To—The Secretary to Financial Commissioner, Punjab

I HAVE the honor to reply to your No. 9641, dated 20th December last, and subsequent reminder No. 2481, dated 17th instant, asking my opinion as to the advisability and feasibility of establishing fodder reserves in the Cis-Sutlej tract, or of storing hay or other fodder in years of good rain.

2. The people of this tract are already in the habit of making fodder preserves. There is not a village in the Karnál Nardak in which a very considerable area of grass land is not hedged in and kept from the cattle. These preserves, generally picked spots, yield wonderful crops of grass in fair years; and the grass is cut and stacked as hay. Whether it is ever so kept over one year into another, I cannot say; but I am certain that it never lasts into the

second year of drought, which is the one that kills the strong and healthy cattle. In the first year the mortality is very largely confined to the old and sickly, whom it is not worth while to feed when fodder is scarce.

3. It seems to me that it would be impracticable for Government to form fodder preserves of its own. It would in most cases have to take up land; and as a very large area in specially selected spots would be required, the initial expense would be great. The annual cost of watching the preserves would be very large; while the watchers would add to the swarm of small officials who are almost the worst feature of an Indian Government. In bad years no grass would be produced; and it would therefore be necessary to store the hay, often for four or five years (if it would keep as long) in expectation of a drought. When the drought came the difficulty of distribution would be immense, as small Government preserves scattered all over the country would be impossible. Government would have to sell at a rate which would not recoup anything approaching the original cost. The fact that fodder was available would often prevent the cattle being, as they are now, sent away to the hills in search of pasture; the hay would all be eaten in the first year, and the cattle would be no better off than they are now in the second year, which is the real season of trial. Almost all these objections would apply to the growth and storage of *chari* or jawár fodder by Government.

4. It would be better in every way if we could encourage the people to store fodder for themselves. But it is difficult to see what Government can do in the matter. The revenue imposed on grass land is so imperceptibly small that to remit it on grass preserves would have no effect. To remit land revenue on an acre of cultivation for every acre of land preserved for grass would involve annual measurements and extortion, and would lead to sterile land being enclosed and returned as preserved area. If the system of ensilage can be successfully worked with *chari* in the Punjab, I think that the people could be gradually induced to adopt it. But the matter should be worked out down to the minutest details by the Agricultural Department, and success assured before anything is done in the districts; since the initial failures of a Deputy Commissioner's experiments more than outweigh in the minds of the people his ultimate success.

5. One great difficulty of the whole matter is the length of time for which the fodder would have to be stored, and the impossibility of foretelling when it will be most needed. There may be four or five good grass years in succession. Then a bad year comes, but not very bad. If the stored fodder is all consumed, the next year may be an absolute famine, when the supply would have been invaluable. If it is held up, the next year may be a good one again, and the hay might rot in the ricks. It would always be difficult to refuse to supply hay which was actually in stock at the first approach of distress.

No. 479, dated Lahore, the 4th July 1885.

From—H. C. Fanshawe, Esquire, Offg. Junior Secretary to Government, Punjab,

To—The Offg. Senior Secretary to Financial Commissioner, Punjab.

I am directed by the Lieutenant-Governor to acknowledge the receipt of your letter No. 79 C, dated 19th June 1884, submitting the report called for in the communication from this office, No. 163, dated 7th April 1883, and conveying the opinions of Colonel Davies and Lieutenant-Colonel Wace on the subject of the establishment of Fuel and Fodder Reserves in the Punjab on the lines laid down in the Circular of the Government of India, in the Department of Revenue and Agriculture, No. 16 A, dated 1st March 1883.

2. In that resolution the Government of India pointed out the necessity of taking some action for the further protection of the cattle of the country against drought, and indicated the general outlines of a scheme for securing a better supply of fodder in years of drought. This scheme, while seeking to encourage the people to store more carefully the fodder produced by their fields, and, where possible, to store hay as well, has for its principal object the improvement of existing grazing lands, and in particular those waste lands such as the offshoots of the Aravalli range in the Delhi and Gurgaon districts, the Salt Range and Ráwalpindi hills, and the Bar and Thal wastes in the west of the Province, which now produce little or no food for the cattle and flocks of the villagers. To effect this object, and to enable the grass and the under-growth of bushes and scrub on which Indian grass necessarily depends so largely for protection in seasons of drought, to reproduce themselves strongly, it will be necessary to close the areas under treatment against

grazing for a time, and it is proposed to call such areas fuel and fodder reserves. It is notorious that under the present system of grazing, the possible supplies of grass and of fodder from the edible leaves and sprays of bushes and trees are far less than they should be ; and it is desired that Government, where Government owns lands, and that Local Bodies where they can lease lands, or can induce the villagers to allow them to manage such lands on behalf of the villages, should seek by careful management to increase what may be termed the natural fodder supply of the country, and to lead the people by their example to the gradual adoption of such a system themselves. It is further suggested that in some cases it might be worth considering whether land should not be purchased for the purpose of forming fuel and fodder reserves.

3. There does not appear to Sir Charles Aitchison to be anything that is *primâ facie* fanciful or impracticable in such a plan. It is to be regretted however that the scheme of the Government of India should apparently have been misunderstood in various important respects in the opinions now before Government. The Lieutenant-Governor does not think it necessary to answer all the objections to it raised by the late Commissioner of Settlements and Agriculture ; but as regards three of them, which seem to lie at the root of all the rest, His Honor desires to record the following remarks. These three are (1) the idea that Government intends to push back cultivation in order to improve grazing lands ; (2) the contention that the provision of supplies of fodder must be dealt with in the same manner as that of the supply of grain ; and (3) the opinion that the people of the Punjab have little or nothing to learn in the matter of providing fodder against seasons of drought.

4. The first misconception appears to have given rise to most of the adverse criticism of the scheme. It is based however on a complete misunderstanding of the proposals of the Government of India, unless indeed the above sketch of their objects and aims is altogether a mistaken one. No comparison of the merits of arable and grazing lands is involved in the present question. The desire of the Supreme Government is to utilise, thoroughly and economically, land which is now neglected and abused, either directly or indirectly as circumstances may dictate. It may be desirable for Government to purchase small areas for fuel and fodder reserves when favorable opportunities offer ; but this is not an essential feature of the scheme, which aims at enabling land, which now grows little or nothing, to grow a decent crop of hay and scrub bushes in future. That this can be done has been shown in the case of Ajmir, and the Lieutenant-Governor has no doubt that this can be equally shown to be the case in the Punjab. There is no question of fodder farms, which would imply the elaborate cultivation of fodder crops, and possibly the reduction of the area of grain crops. The question is one of fuel and fodder reserves as above explained, and it is to be regretted that a misleading nomenclature should have been unnecessarily introduced into the present discussion. His Honor fully agrees with Lieutenant-Colonel Wace and the Financial Commissioner that it would be impracticable for Government to purchase large areas. But Government can at least conserve suitable areas that belong to it, and encourage the people, through their local committees and headmen, to conserve areas that belong to them. There is no need to be passive in the matter, nor is there, in the opinion of Sir Charles Aitchison, any excuse for being so.

5. In the next place, the Lieutenant-Governor thinks that it is entirely a mistaken view to consider that the food supply and fodder supply of the country stand on the same footing. Grain enters into the widest commercial transactions in the world ; fodder trade is always more or less local. Grain is easily conveyed immense distances and easily distributed ; fodder is not. The measures suggested have in view the improvement of the supply of fodder as explained in the preceding paragraph, as much as or more than its storage. There appears therefore to the Lieutenant-Governor to be no analogy between the two cases of the

storage of grain for human food to keep people alive in famine, and the present proposals of the Government of India, and His Honor thinks that it is a matter of some surprise that confusion should have arisen in this respect.

6. In the third place, Sir Charles Aitchison is unable to admit the conclusion to which the arguments of Colonel Wace tend, *viz.*, that the people have nothing to learn in the matter of producing and storing fodder. It would be contrary to the whole experience of human progress that this should be the case in the widest sense ; and it is notorious that, in the matter of protecting and developing their grazing grounds, the people of India are, as a whole, as backward as any people in the world. Here and there exceptions to the general rule undoubtedly exist, as witnessed by the hay fields in the Himalayas, and the protection of village reserves in the Nardak country of Karnál to which allusion is made by Mr. Ibbetson in his letter No. 78 of 28th March 1883, which is forwarded with the present correspondence. The fact that it is desirable for Government and Local Bodies to set a better example to the generality of agriculturists in the matter of producing and storing fodder does not in the least imply any depreciation of the efforts which Colonel Wace states that they already make according to their lights. On the contrary, it is the encouragement afforded by these efforts which renders it desirable that Government should do all in its power to further them systematically ; and that they need such furthering appears to His Honor to be beyond the room for doubt. Whether the people will be induced to adopt the system which the Government of India wishes to see introduced can only be ascertained by actual trial ; but whether they do or not, the Lieutenant-Governor is of opinion that it is the bounden duty of the Local Government to set them a good example in this respect, and, as far as in him lies, Sir Charles Aitchison wishes to do this. If after a patient experiment of some years of duration it is found that little or nothing has been effected, the experiment can be abandoned. The Lieutenant-Governor cannot believe, however, that this will be found to be the case.

7. The letters of the Commissioners of the late Hissar and Delhi Divisions and in particular the letter of Colonel Grey, offer considerable encouragement in the matter under consideration. There is no need to wait until provision is made by law for the constitution of fuel and fodder reserves. Much can be done under Chapter VI of the Forest Act, especially under Section 38, if the people be encouraged, and also under the Local Boards Act which contains a clause framed with this very view. The action already taken by the District Committees of Gurgaon and Delhi, of which an account is contained in the report on district arboriculture for 1883-84, is also most encouraging. In the latter district it appears that the villagers have already made over considerable plots of land to the Committee on the following conditions :—

"A tank to be dug by the Committee, the land to be enclosed and guarded and planted at the expense of the Committee, the property in the soil to remain with the zemindárs, who, whenever the Committee choose to cut the trees, will receive half the value,"

and there can be no doubt that this plan will result in the development of grass and underwood as well as in the growth of trees. Similarly, in the Gurgaon District the District Officer reports that "A scheme for a system of conservancy on the bare ranges of hills, through the joint efforts of the people and the Local Boards, is being prepared, and will be tried in the ensuing season for planting operations." The Lieutenant-Governor understands that this scheme is meeting with a fair amount of success, and he observes with satisfaction that the District Board have voted a considerable sum towards its furtherance during the current year. With such encouraging examples of the willingness of the representatives of the people to create fuel and fodder reserves of their own, His Honor thinks that it would be no less than a failure of duty for Government to stand by and offer no assistance either by example or the exertion of influence.

8. The action which Sir Charles Aitchison now desires should be taken with regard to the present matter is as follows :—

In the *first* place, a very simple statement of the advantages of the scheme set forth by the Government of India and of the desirability of its adoption should be drawn up and translated, and should be circulated widely to all District and Local Boards and to all leading persons of the Cis-Sutlej districts of the Province, which are the most liable to suffer from drought, and in which therefore the necessity of taking measures to improve the fuel and fodder supply is most pressing. His Honor will be obliged if the Financial Commissioner will arrange for this. In the *next* place, the Deputy Commissioners and subordinate Revenue Officers of the districts concerned should do all in their power to encourage the District Committees and Boards to follow the example set in Delhi and Gurgaon by taking an interest in this matter and carrying the people with them in it. The villagers are fully alive to the necessity of preserving their remaining grazing areas, and restrictions upon the breaking up of these lands have, it is believed, been imposed in the Village Administration Papers of most recent settlements. There is every reason to believe, therefore, that they will be willing to co-operate with the District Boards and Committees, and there is no reason why such co-operation should not presently develop into individual action on their own behalf. In the *third* place, District Officers should at once submit proposals for treating areas belonging to Government as fuel and fodder reserves. In the east of the Province these must for the present remain under the management of the District Officer, or of District Boards, to whom Government may entrust the areas ; but in the west the closer association of Civil and Forest Officers which is on the eve of accomplishment will allow fuel and fodder reserves to be placed under scientific management. It would appear that there are several areas in the Delhi and Rohtak Districts, the Hansi Bir, and possibly the Sirsa Bir in the Hissar District, the area in the village of Khirowála in the Fázilka tahsíl lately purchased by Government, and perhaps other areas in the Ferozepore District, the village of Theh Barásua in the Umballa District, regarding which orders were recently issued in my letters noted in the margin, which can be made available for Government fuel and fodder reserves, and there may be other areas also, regarding which the Deputy Commissioners of all Cis-Sutlej Districts, except Simla, should now report in full. In each case it should be briefly stated what and where the area is; what income has hitherto been derived from it; at what cost it can be protected against grazing (it is believed that in most cases this can be cheaply done by a bank topped with pála thorns in the manner of the country side), and what scheme of management is proposed, *i.e.*, will the area be managed direct by the Deputy Commissioner or by the District or Local Board, or by some zaildár or zamíndár selected by the Deputy Commissioner for the management ? These reports will enable orders to be passed on each individual case. In the instance of the Rohtak District, the Deputy Commissioner should base his proposals on the report upon the Jhajjar Birs prepared by Mr. Down in the spring of 1883, and on which the opinion of the Financial Commissioner is still awaited in connection with the orders of the Government of India upon the Final Report of the Rohtak Settlement. As far as may be possible, the Lieutenant-Governor would be in favour of placing fuel and fodder reserves under the management of District and Local Bodies as soon as the areas have been properly organised, and a copy of the orders which have been issued in this regard with respect to the Rohtak Birs is annexed for the information of the Financial Commissioner. The system of management having once been determined, the results of the work in hand would be specially noticed in the Revenue Administration Report of the year and in the triennial Arboriculture Report ; and at the end of five years a special report on the progress made in all respects should be submitted. It will be necessary to arrange for a careful account of the amount of fodder produced by each reserve. As far as possible,

No. 193, dated 23rd May 1885.
No. 260, dated 17th April 1885.

this should be stacked in the early days of protection, in order to show the people the advantages of storing hay against a season of drought. It is not necessary perhaps to enter into further details of management on the present occasion, as these can be most conveniently considered when the further reports of District Officers are submitted. It will, no doubt, be desirable then to draw up a brief set of rules for the management of the reserves. A copy of the letter addressed to the Conservator of Forests regarding the development of fuel and fodder reserves is annexed for the information of the Financial Commissioner. The work of the Forest Department will necessarily be confined to the west of the Province. For the submontane districts between the Sutlej and Jhelum, which but seldom suffer from failure of the rains, it will be sufficient to take measures when the success of the attempts made elsewhere in the Province has been seen.

9. In connection with the subject of village fuel and fodder reserves to be managed by the villagers or their representatives, a suggestion was made in paragraph 2 of my letter No. 163, dated 7th April 1883, with reference to the farmed estates of the Sirsa District, that a clause should be entered in the deed of grant of the proprietary right providing, wherever possible, for the reservation of a certain proportion of the unbroken waste as village grazing grounds. It now appears from paragraph 10 of the letter of the late Commissioner of Settlements and Agriculture, No. 232, dated 29th April 1884, that Colonel Wace is of opinion that difficulties exist in the way of carrying out this suggestion owing to promises which have been made to the cultivators, and similar obstacles are said to obtain in the case of the lands in the Kaithal tahsíl of the Karnál District which are held on much the same tenure as the farmed estates of Sirsa. The Lieutenant-Governor does not, however, regard the objections raised by the Financial Commissioner to the reservation of a due proportion of the waste area for fuel and fodder purposes as being conclusive; and, as it does not appear from the facts of the case as at present before His Honor why such conditions should not be imposed, or that there would be any breach of faith with the cultivators in imposing such conditions, I am to ask that a special report may be furnished showing why a stipulation of this nature cannot be demanded from the cultivators of the Sirsa and Kaithal villages. Meanwhile, the District Officer should use his influence in the latter case to check the destruction of jungle, which, as noticed by the Commissioner of the Delhi Division, is being caused by the villagers in their useless attempts to develop temporary cultivation.

10. In the case of all schemes for the colonisation of waste lands in the west of the Province a sufficient area of good soil will invariably be set aside at intervals throughout each tract to form fuel and fodder reserves in addition to the grazing lands which will be assigned to each village. In submitting their recommendations for each scheme this point must be clearly borne in mind by the local officers, and should be prominently noticed by the Financial Commissioner. It will be desirable no doubt to fix the village grazing areas, and the areas of the proposed fuel and fodder reserves, on some acknowledged basis of the usual proportion of cattle to the anticipated area of cultivation, or the like, and the Financial Commissioner will no doubt issue the necessary orders for this. It will perhaps be desirable to embody in the conditions of the deeds of lease or sale of such lands the terms in accordance with which the grazing lands shall be managed, and to include among these terms a stipulation that a portion of the village grazing area shall be closed from time to time to allow of reproduction.

11. It is not necessary perhaps at the present stage to direct an elaborate analysis of every district in the manner contemplated by the Government of India in paragraph 10 of their Circular of 1st March 1883. It is desirable, however, that each Deputy Commissioner of the Cis-Sutlej Districts, excluding Simla, should, with the report now required of him, state fully the area of the village grazing lands and the number of cattle, camels, goats and sheep for which

grazing has to be found in the district, and should indicate clearly the comparative advantages or disadvantages of his district in the matter of grazing. The Lieutenant-Governor will be glad if the Financial Commissioner will issue such further instructions as he may consider necessary in this regard.

12. In his review of the Final Report of the Jhang Settlement, the late Officiating Financial Commissioner, Colonel McMahon, has suggested that measures should be adopted to propagate the better kinds of grasses in the Punjab. If this could be done, the fodder supply of the villagers would obviously be largely increased thereby, and the Lieutenant-Governor would be glad to receive suggestions on this point. His Honor will also be greatly obliged for any practical suggestions which will assist to forward the object which he has in view in creating fuel and fodder reserves.

13. In conclusion, I am to say that the Lieutenant-Governor is satisfied that much can be done for the material good of the Province in the directions indicated by the Government of India. The amount of this good must, however, depend very largely on the interest taken in the matter by District Officers and the example set to the people by Government. Sir Charles Aitchison trusts therefore that he will have the cordial co-operation of all officers in seeking to establish fuel and fodder reserves in the Punjab.

No. 480, dated Lahore, 4th July 1885.

From—H. C. Fanshawe, Esquire, Offg. Junior Secretary to Government, Punjab,

To—The Offg. Conservator of Forests, Punjab.

I am directed to forward, for your information and guidance, a copy of the papers noted in the margin, regarding the formation of fuel and fodder reserves in the Punjab.

Government of India Circular No. 16 A. of 1st March 1883.
Punjab Government letter No. 163—416 of 7th April 1883.
Letter from the Financial Commissioner of the Punjab, No. 79 C. of 9th June 1884, and enclosures.
Letter from the Punjab Government, No. 479 of 4th July 1885.

2. The Lieutenant-Governor will be obliged if you will take the matter into your earliest consideration as regards the west of the Province, and will submit proposals for carrying out the experiments desired as soon as possible. Your proposals should have the concurrence of the Deputy Commissioner of the district in which the experiments are to be made.

3. The Lieutenant-Governor is of opinion that a sufficient area to render the experiment satisfactory should be specially treated as a fuel and fodder reserve in the Lahore, Gujránwála, Jhelum, Ráwalpindi, Montgomery and Mooltan Districts. His Honor does not doubt that, with all due regard to grazing conveniences of the people, it will be found possible to secure an area fit for experiment in each of these districts. The area chosen should be treated strictly as a fuel and fodder reserve, and should be fenced and protected as far as may be necessary. With regard to the latter requirements, it will be necessary to select an area of moderate size for the experiment. Rules for the management of the areas should be drawn up by you for approval, and the whole results must be carefully recorded and analysed from time to time. After five or six years it will be possible to say whether the experiment has proved or will prove a success. As far as possible hay should be stored in these areas against the occurrence of a season of drought

4. The Lieutenant-Governor does not think that it is necessary to add further detailed instructions, as his wishes in all respects can be readily gathered from the papers now forwarded to you. The fuel and fodder reserves selected by your Department will be managed by the District Forest Officer under the general directions of the Deputy Commissioner in accordance with the rules drawn up for the closer association of Revenue and Forest Officers, and which will

shortly be issued. It is necessary for this reason that the areas selected by the Forest Officer should have the approval of the Deputy Commissioner in the first instance.

5. I am also to enquire whether it would be possible to treat part of the Kalesar Forest as a fuel and fodder reserve. On this point the opinion of the Deputy Commissioner of the Umballa District, as well as of the Forest Officer of the Phillour Forest Division, should be sought by you.

No. 481, dated Lahore, 4th July 1885.

From—H. C. FANSHAWE, Esquire, Offg. Junior Secretary to Government, Punjab,
To—The Secretary to the Government of India, Revenue and Agricultural Department.

WITH reference to your Circular No. $\frac{53\text{ A.}}{50-3}$ of 8th May last, I am directed to forward, for the information of the Government of India, a copy of the correspondence noted in the margin, regarding the formation of fuel and fodder reserves in the Punjab.

Punjab Government's letter No. 163, dated 7th April 1883.
Letter from the Financial Commissioner of the Punjab, No. 79 C., dated 9th June 1884, and enclosures.
Punjab Government's letter No. 479 of this day's date, to the Financial Commissioner, Punjab.
Punjab Government's letter No. 480 of this day's date, to the Conservator of Forests, Punjab.

2. The Lieutenant-Governor regrets that little or nothing practical should have been done so far in this Province to further the views of the Government of India in the above matter. His Honor trusts, however, that under the instructions now issued he will be able to report progress to the Supreme Government during the course of the present year.

Punjab Govt. Press, Lahore—31-8-85—350.

APPENDIX A.

Extract from the Famine Commission's Report, Part II., Chapter VI., Section 2, paragraphs 8 to 10, page 179.

Village forests.

8. There is a chapter of the Forest Act purporting to promote the formation of village forests by the assignment of small forest areas to the use and management of village communities. Such areas have been assigned in most parts of India where forests exist, a portion sufficient for the wants of the people being always marked off and assigned to the villages before the superfluous area was taken up as a Government reserve; but we have not learnt that much has been done in the direction of managing or conserving these tracts, and it is probable that the measure is not easily applicable to localities distant from the existing forest tracts. In the Hazára district of the Punjab the village forests are managed, under the control of Government, in the interest of the people to whom they belong, and are open to the villages concerned for the supply of their requirements. In the Kotar district of Mysore an arrangement has been made voluntarily by the ryots, with the encouragement and assistance of the district officer, under which considerable areas of poor land within the limits of villages have been set apart as forest land, to be managed by the patels and village community under simple rules of conservancy, the villagers planting them with trees, and the village servants protecting them from mischief; while the people of the village are allowed in return to take brushwood and timber, and to pasture their cattle within them. In Madras also a somewhat analogous system has been established since 1859, when the Jungle Conservancy Fund was instituted for similar objects, and has subsequently been brought into operation in all districts. On the other hand, in the Central Provinces, where extensive tracts were at the time of settlement assigned as village forests for the benefit of the agricultural communities, it is stated that the proprietors have so far misused their position as to keep these tracts for their private profit, by selling the produce and forcing their tenants to resort exclusively to the Government protected forests for such timber and fuel as they require. This is in direct violation of their engagements, by which the proprietors are bound to allow their cultivators to take from these forests, without charge, all wood required for agricultural purposes, and to permit them to graze their cattle in them without payment.

Importance of extending the system of village forests.

9. We have evidence from all parts of India that the mischievous practice of indefinite trespass on the public forests has sprung up from short-sighted eagerness for immediate profit and ignorance of the conditions under which alone the reproduction of forests is possible; and the public interest evidently requires that any reasonable privilege of this kind, which it would be harsh to abolish, should be enjoyed only within defined limits and under salutary rules. Village communities may thus be brought to avail themselves of forest produce in a manner consistent with its reproduction, and not with a license recklessly destructive of the public property, and we think it probable that some of the less productive tracts now under the plough might be managed with greater benefit to the coummunity as protected forest for village uses than as arable land.

General objects to be arrived at.

10. So far any immediate advantage is to be sought from the extension of forest in respect to protection against drought, it will, in our opinion, be mainly in the direction of the judicious enclosure and protection of tracts, such as have just been alluded to, from which improved and more certain pasture may be secured for the cattle of the vicinity, a supply of firewood secured which may lead to a more general utilisation of animal manure for agriculture, and a possible addition made to the power of the subsoil to retain its moisture, and to the prospect of maintaining the supply of water in the wells. In all cases existing communal rights of pasturage should receive careful attention, and, as far as possible, efforts should be made to extend facilities of this description, and to add to their value by a suitable system of protection. As to the protection of the higher hill slopes from denudation, it may confidently be stated that they will in any case be more useful if kept clothed with wood than subjected to the wasteful and destructive process by which they are brought under partial and temporary cultivation, and that, whether the expectation of an improved water-supply as a consequence of such protection is fully realised or not, there is, on other grounds, sufficient reason for arranging for the conservation of such tracts where it is practicable.

Extract from Review of the Forest Administration in the several Provinces under the Government of India for the year 1880-81, *by the Officiating Inspector-General of Forests, to the Government of India.*

Fodder and Fuel Reserves.—The establishment of combined fodder and fuel reserves was referred to in last year's review, and a good stride in advance has been made during the last 12 months.

In addition to the Ajmere and Merwara reserves, mentioned in last year's review, a fodder and fuel reserve has been established near Amraoti. In the North-Western Provinces a scheme is under discussion for taking up 100 square miles of usar (saline) land, with the view of transforming the several blocks into grass and fuel reserves. Experiments in this direction were commenced some two years ago by the Agricultural Department of the Province, but it is now proposed that the Forest Department shall take over the work.

The Government of Madras, it is believed, has this subject now under consideration, and salutary measures are likely to be adopted shortly.

The Punjab possesses some 15,000 square miles of so-called Rakh lands scattered over the various districts. Only a small portion of this area has as yet been definitely set aside for the supply of fodder and fuel, but it is hoped that the work will be rapidly advanced now, by deciding what areas are to be maintained permanently for fodder and fuel, and what parts shall be thrown open for the extension of cultivation. The system of district forest officers will, in the Punjab more than anywhere else, facilitate the solution of the questions involved, and the sooner it is introduced into that Province the better.

Generally speaking, the establishment of fodder and fuel reserves is of the utmost importance in the dry districts of the North-Western, Central, and Southern India, and the subject cannot be pressed too strongly upon the attention of Local Governments, whose duty it is to prevent or reduce the mortality of cattle during years of famine, apart from the fact that the increase in the supply of fuel must ultimately restore manure to its legitimate use, instead of its being burned, as at present, over large stretches of country.

APPENDIX B.

Chapter VIII., Page 26, " The more deadly forms of cattle disease in India." Manual by MR. J. H. B. HALLEN, 1871.

HOVEN.

" It is a common disease among cattle, and results from irregular feeding, such as eating of food to which the animal has been previously unaccustomed. After the first shower of the early rains, when succulent shoots spring up, cattle, which have been starved for weeks are apt to overfeed themselves and become attacked with Hoven. Several animals of a herd may thus be seized, and the affection may almost appear epizootic or plague-like."

APPENDIX C.

BENGAL.

Extract from Report on the Forests of Khurdah, Orissa, by J. S. GAMBLE, Esq., *Officiating Conservator of Forests, for the year* 1881-82, *page* 12, *paragraphs* 44, 45 *and* 46.

Grazing.—The present unsatisfactory state of the Khurdah forests, especially on the level lands near the villages, is principally due to unrestrained and indiscriminate grazing. No charge for grazing has been as yet made either for cattle belonging to ryots of the estate or to cattle from outside. Every village possesses a certain amount of cattle, partly bullocks used for cultivation and carts and for the production of manure, partly buffaloes used for carting and to provide milk and ghí, and the forest officers estimate the total number of head of cattle at present grazing in the Khurdah forests at not less than 50,000 belonging to ryots, and 12,000 to 15,000 belonging to outsiders. The damage done by this large number of cattle is very great, and any measures taken with the object of regenerating or improving the crop of forest, must be taken with especial consideration of the necessity for the restriction of grazing on these areas.

As already explained the condition of the Khurdah forests is for the most part that of scrub jungle cut and hacked and browsed over indiscriminately. In some parts scarcely a tree, seedling or shoot shows itself above ground, but it is eaten down, and in this way proper reproduction is almost impossible ; and when it is considered that the lands near the villages are exposed both to continual cutting for firewood and to constant grazing, it is easy to understand that, without some strong measures, the condition of these lands is not likely to improve. Perhaps the most destructive enemies in the way of grazing are the herds of goats which, especially in zillahs Kohori and Banpur, have rendered parts of the country almost bare, with the exception of a few round thorny masses of twigs. These goats are the property of goat-herds from the Ganjam district of Madras, who have settled themselves in Khurdah and have done a great amount of damage by travelling from mouzah to mouzah and eating off the jungles. When the scrub available in one mouzah is exhausted they proceed to another, at the same time abandoning any cultivation they may have had. It does not appear to me that any harm would be done by the exclusion, at any rate for a considerable period, of these herds of goats which are really more damaging than even the buffaloes of the estate. Next to goats these latter are the most destructive, for besides what they devour, they do considerable damage by trampling or knocking down saplings. The question of the closing of areas against grazing and the means to be taken to exclude foreign cattle will be subsequently treated of.

Extract from Appendix A. to the above Report, by W. C. TAYLOR, Esq., *Deputy Collector, on the Khurdah Sub-Division for the year* 1872-73.

The amount of cultivation in Panchgarh was also a surprise to me. I found every bigah of culturable land cultivated up to the foot of the Hills. The country is covered with granite and gneiss rocks, mostly quite bare of jungle, and the people are already in distress for firewood, both in Panchgarh and Kuspala ; the preservation of the jungles has not been commenced a day too soon.

The soil is all the old undulating alluvium with ghooting lime in large quantities ; of grazing ground for the cattle there is none left ; and I left strict orders to stop part of

the *toila* or dry cultivation at the base of the Hills, so as to allow grazing room for cattle The ryots all complained bitterly of want of grazing ground and of the destruction of the jungles, although it is they who have recklessly cut down or rooted up everything. There is a little jungle on the boundary between Patboudh and Khandhara, with a good many sál saplings and this is the land that the ryots of Khurdah and Khandhara were fighting about. The Commissioner has awarded the tract to Khurdah, and with a little judicious management, and preserving tracts of hill and jungle here and there, the supply of firewood and bamboos will in a few years be sufficient for the wants of the people, and the sál preserves will be of great value, but unless the country is looked after, very great distress will be caused by the reckless destruction of jungle made by ryots who are not restrained. There is still plenty of large jungle on the Hills at the trijunction of Ránapur, Nyagarh and Khurdah, but these jungles being at some distance from the principal villages, the ryots are too lazy to go far for their wood, and continue to root up every stick they can find close to their houses. I have made two sál preserves in Panchgarh and one in Mainbandh, and one in Kusfala, and the result even of two or three years' preservation is wonderful.

The trees, though apparently saplings, are sprouts from the roots of old forest trees and grow much faster than saplings would grow.

North-Western Provinces and Oudh.

Extract from the Revenue Administration Report for 1877-78, *Chapter I., Section IV., paragraph* 8.

There were as might have been expected in a year of drought, few outbreaks of any specific disease among cattle during the year. But they suffered from the scarcity of fodder consequent on the drought, and the loss of valuable farming stock during 1877-78 must in many districts have been enormous. When all hope of rain had been abandoned in September, cattle were sold and slaughtered for the mere value of the hides. No attempt has been made to compute the number of animals that perished or were consigned to the shambles.

Extract from the Report on the Revenue Administration for 1880-81, *Chapter I., Section IV., paragraph* 19.

The usual forms of cattle disease were more or less prevalent, but there was no serious outbreak, except in the Allahabad and Jhansi divisions.

The extensive failure of the fodder supply predisposed the cattle to disease, added to which there was a deficient supply of wholesome water for drinking purposes. The Collector of Banda writes :—" In reality the cattle died as much from starvation and bad food as from any actual disease. The failure of the rains caused failure of all fodder, and in December the cattle were being fed on chopped leaves mixed with a little *bhusa*. In many villages the wells dried up, and there was not enough water for both men and beasts. The cattle therefore got insufficient water or the shallow foulness of a half-dry pool."

The Commissioner of Jhansi writes as follows :—" Cattle disease was very prevalent in Lalitpur, where the large number of 27,900 head of cattle are reported to have died. The stock of the district, however, is very large, and of this number some 12,000 are reported to have died of old age, &c. It was bad also in Jalaun, where the deaths are estimated at over 9,000 head. I fear this is an under-estimate. A great part of the district was utterly without fodder for the cattle. I saw large herds of starving beasts, great numbers of whom must have succumbed before the rains produced wholesome pasturage. Bhusa was selling at three times the ordinary price, and it was only well-to-do people who could afford to buy it.

" Luckily the drought seemed to suit some of the bushes that flourish in ravines, and on these and the leaves of trees cattle dragged on a wretched existence. At the beginning of the drought many people drove their cattle off to Chirkhari and other places where fodder was to be had, and so saved their lives ; but I fear the loss from starvation was very considerable and will be long felt. In Jhansi disease only prevailed in one pargana, but where it did prevail proved very fatal. It seems to be useless to attempt to introduce the European mode of treatment. Segregation is impossible for people who as a rule have but one cattle-shed, and like their beasts to be so near them at night that they can hear their slightest movement and prevent the ever-dreaded cattle thief."

The following extract from the Allahabad report describes the state of things in that division :—" In the two Bundelkhand districts disease among cattle was especially rife. Elsewhere the mortality from this cause was not so great as had been anticipated from the extensive failure of the fodder supply.

" From the other districts, Jaunpur excepted, large numbers of cattle were taken for pasturage to the forest tracts in Banda, and although the deficiency in food was thus to a certain extent met, the want of water, owing to the wells having dried up, gave rise to great difficulties and tended to the spread of disease. The mortality in the Hamirpur district was very great, amounting, it is believed, in two parganas to one-half of the entire stock. Everywhere disease was engendered and aggravated by the want of green grass and other nutritious food, added to which there was a deficient supply of wholesome water for drinking purposes

"The people as usual resorted to the leaves of trees, and to such an extent that in some portions of the Allahabad district, all available trees were stripped of their leaves.

"Remedial measures, such as the segregation of infected cattle, were suggested to the people, and in some instances insisted on. But, as a rule, the people were indifferent to the adoption of such precautionary means, and in a year like the one under report, when the failure of fodder was on so extensive a scale, it was almost impossible to secure the isolation of diseased cattle and to provide for their being properly treated. The heavy mortality in the Banda district may be accounted for by the presence of a large number of cattle from surrounding districts. Altogether, the past year has been a very trying one to cattle."

There is no need to multiply these extracts, all of which tell precisely the same story. It is useless to prescribe green food when none is to be had, or to advise segregation when it cannot be carried out. The people, too, generally look on these outbreaks as the visitation of God, and trust much more to "puja" and the purohits' incantations than to anything else. One point the Board desire me to notice. The Collector of Banda writes that in the Karwi sub-division the Government forests provided pasture-grounds for many cattle who might otherwise have succumbed. The possibility of doing more in this direction with a view to providing pasturage in seasons of severe drought is a question which deserves consideration.

Extract from a Note by MR. WILLIAM CROOKE, *Manager of the Awa Estâte under the Court of Wards, dated the 22nd November* 1881.

The condition of the cattle during the hot weather, until the rains produce a scanty crop of grass in the usar plains and barren land, is miserable in the extreme. Numbers die every year of sheer starvation, and numbers from disease induced by indigestible fodder. Last year (1880) nearly every acacia tree in this part of the country was stripped for fodder, and I have even seen the people chopping up green branches an inch thick, and feeding cattle on them for the sake of the scanty sap and bark.

The state of things which I have described above is that of ordinary years, and the want of fodder is, of course, greatly aggravated in years of famine. Large heads of cattle are kept on the Jumna ravines and in the grass lands at the other side of the river. When the supply fails there, in season of drought, enormous herds of cattle are driven into the Doáb, and the want of fodder is thus intensified. In the famine of 1877-78 thousands of these cattle died in Agra and Etah districts.

PUNJAB.

Revenue Administration Report for 1877-78. *Extracts from the Lieutentant-Governor's Review thereof.*

3. In the Punjab, where the number of cattle maintained is very large, especially in the grazing districts—Cis-Sutlej and the Bari districts north of the Ravi—the failure of grass produces effects almost as calamitous as scarcity of food-grains used by men.

35. As has before been noted, the failure of grass caused very great mortality among cattle, and disease was unusually prevalent.

In the Jhelum district, the loss from drought was estimated at from one-quarter to one-half the total number of cattle. From Umballa it was reported that almost two-thirds of the cattle died, though it is difficult to believe that this statement is not an exaggeration. In the Hissár and Delhi divisions the loss was also great, and it was estimated that nearly half a million of cattle died. It will be some years, even under the influence of favourable seasons, before the country recovers from this serious diminution of agricultural wealth.

The Revenue Administration Report of 1878-79 *at page* 18 mentions that the quinquennial statement, comprising the period from 1868-69 to 1873-74, exhibits a decrease of 448,795 in the number of cows and bullocks in the Punjab, and an increase of 56,591 in the number of ploughs.—"The increase in ploughs is, however, naturally progressive, being the result of extended cultivation, while cattle are subject to extraordinary diminution in specially bad years."

Revenue Administration Report for 1879-80.

Page 22.—"The cattle disease and deficiency of pasture of the last few years, seems to have had a marked effect on the stock of the country."

Extract from a Report on the revised Land Revenue Settlement of the Rohtak district, 1873—1879 *(pages* 76-77.)

"The extensive breaking-up of land which has taken place since 1840 has greatly restricted the grazing grounds of the villages; the present fodder supply grown in the fields is not much more than sufficient for the yearly consumption of the cattle, and leaves but a small margin out of which to provide for against seasons of drought; and in many canal estates difficulty is already being experienced on this score. But few decent-sized stretches of village jungle now exist anywhere. It is most important that these should not be reduced any further now, and that the remaining village jungle lands should be protected."

Extract from a Note by Settlement Officer, Gurgaon district, dated December 1882.

" Before the famine of 1877-78, it was estimated that there were in the district nearly 140,000 plough cattle. At the very lowest estimate 40,000 of these must have disappeared in that year, and the bad years that followed."

BERAR.

Letter from the Resident at Hyderabad, to the Deputy Commissioner of Ellichpur (Berar) quoted in the Review of the Inspector-General of Forests on the Forest Administration in the several Provinces of India during 1880-81 (*page* 11).

The Officiating Resident desires to acknowledge the ready and liberal spirit in which the Conservator of Forests and Forest Officers generally responded to applications made to them by civil officers during the anxious months of July and August, when the rains having failed, the people were in difficulties about fodder for the cattle.

BRITISH BURMA.

Extract from letter No. 143-8—9 (*Settlement*), *dated* 22*nd December* 1880, *from the Chief Commissioner, British Burma.*

33. The need of cattle-grazing reserves has been already recognized by the Government. The cost of cultivation is enormously augmented by the death, annually, of large numbers of plough buffaloes and bullocks. The people for the most part take little care of their animals after ploughing and harvest are over. Hard work is exacted from them ; and then they are left to shift for themselves as best they can. Frequently they lack both shelter and water. The settlement officers have been instructed to allot grazing reserves in *kwins* where all the available land has not yet been taken up for cultivation, and to protect the reserves from encroachment by suitable demarcation and by record in the settlement papers. The Chief Commissioner hopes to be able to report good progress in this important matter next year.

Extract from letter No. 5517, *dated* 13*th April* 1881, *from the Chief Commissioner, British Burma, paragraph* 2.

2. It is essential also that the trees and undergrowth on grazing grounds be protected from injury and destruction. Unless this is done under a rule having the force of law, many of the grazing grounds will in a few years be laid bare, and the tracts will be practically useless for the purposes originally intended. Recent reports received by the Chief Commissioner specially bring to notice the encroachments and the serious destruction of 'jungle' upon grazing grounds in the Hanthawaddy district of the Pegu division. There can be little doubt but that similar destructive process is or hereafter will be in operation on other grazing grounds. It will be observed that the Chief Commissioner proposes to prohibit the removal of grass from grazing grounds during the months of December to May inclusive.

This period comprises the dry season, when grass is comparatively scarce, and when it is gathered and conveyed to large towns for sale. It is necessary that such grass should be left on the grazing grounds for the use of cattle driven thereupon. In the rainy season, when cattle are busy in the fields, villagers must be allowed to cut or remove grass from grazing grounds, and during that season grass will reproduce itself promptly enough.

APPENDIX D.

Report on a visit to the English and Scotch forests by the Professors and Students from Nancy Forest School, by M. BOPPE, *Inspector of French Forests.*

THE total area of Scotland is about 20,000,000 acres, hardly one-quarter of which may be reckoned as arable, forest or pasture land, the remainder being occupied by the lakes, rivers, peat-mosses, moorlands, bare rocks and mountains. It is surprising then to find that against such a vast area of uncultivated ground, only 734,490 acres, according to the official returns of 1872, are classed as woodlands.

There is every reason to suppose that, at a remote period both the highlands and lowlands of Scotland were covered by dense forests, which were successively destroyed by the fire and steel of conquerors and during the anarchy existing under the old feudal system, as well as by the fearful storms which at almost regular intervals sweep over certain districts. So complete, indeed, was this devastation, that, in 1707, all that remained of the grand old Caledonian forests were a few shreds, and those in a most deplorable condition.

From the union of the two kingdoms dates a period of political calm, during which time and the marvellous timber-producing properties of the soil and climate would have done much to repair the ruin, had not the sheep, arch-enemy of all forest vegetation, been allowed to retain his footing in the forests.

The noblemen and great landed proprietors of Scotland at last felt the necessity of doing something to restore the parks and woodlands in the immediate vicinity of their mansions, and by the introduction of plantations to vary the sombre monotony of the boundless heather. It was also necessary on these bare moors, where grazing and shooting form the main sources of revenue, to furnish shelter for the cattle, sheep and deer. Their example was soon followed by the smaller proprietors, and, under the wise patronage of the "Select Society" of Edinburgh, founded in 1754, the area of forest land augmented rapidly, so that in 1812 Scotland possessed, besides 500,000 acres of natural forest, about 400,000 acres of plantations.

The year 1815 marks a pause in the work of replanting which had been so vigorously begun. We do not pretend to enter here into the various causes which led to this economical phenomenon, but it is certain that the laws of 1636, on the constitution of landed properties in Scotland, exercised a baneful influence on the rational cultivation of the soil. The Scottish Parliament in vain sought to counteract the Draconian regulations of these laws, the principal effect of which was to cause the proprietors to look on themselves as only life-tenants of the entailed estates, and consequently to take but a very slight interest in the improvement of the soil and the augmentation of its pecuniary value.

From the moment the planting ceased the area of woodland diminished, and necessarily so, for in any forest where sheep have free entrance, the removal of a tree, whether by the axe of the woodcutter or by the violence of the wind, causes an empty space which can only be refilled by resorting to artificial means. It is thus that the returns of 1872, as compared with those of 1812, show a diminution of some 200,000 acres in the area of forest land in Scotland. Whether it was a portion of the old natural forests, or the newly-planted ones that had disappeared during this period of 60 years, the documents extant do not show. There is however, good reason to suppose that both suffered equally in this respect. For, on the one hand, the construction of the Highland Railway necessitated the employment of a large number of sleepers, which could be procured from the woods of from 50 to 80 years of age, along the line of route ; and, on the order hand, the increased facilities of transport, and the scarcity of wood in England, gave an unexpected value to certain tracts covered with birch, and so tempted many of the proprietors to cut down the old forests composed of this species.

In 1870, the work of replanting seems to have recommenced with increased ardour, and on all sides may be seen young plantations vigorously striving to fill up the gap which separates them from those of half a century's standing.

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As foresters of the Continental school, accustomed to live among forests regularly managed and having for their sole object the production of timber, we had no little difficulty in understanding the widely different motives which actuate forest cultivation in this country. Everywhere we found the forests fenced in on all sides with walls and hedges ; and as a matter of fact, the forester or agent generally carries the keys of the gates in his pocket. We learnt that these costly enclosures were erected, not for the purpose of keeping out the cattle and deer, as in the Jura, but for the purpose of keeping them in ; it appeared to us like shutting up the wolf in the sheep-fold.

We were also struck by the monotonous regularity in the height and age of the trees, unmistakeable sign of their artificial origin and want of methodical management. The forest, here left to its own devices, continues growing just as the hand of man has planted it ; the undergrowth is constantly grazed down by the sheep and cattle, and nature, in spite of the immense resources at her disposal, is quite powerless to modify the work of the planter, or repair the errors committed by woodcutters.

When, under such circumstances, the time arrives for the trees to be cut down, or should they be uprooted by a hurricane, the forest disappears in its entirety, owing to the total want of young growth which is necessary as a link between the old forest and the new one

which ought to be created. Such, at least, appears to us to be the case in all the forests that we visited in the valley of the Tay and its tributaries, and further north, near the foot of Cairngorm.

Not far from a mansion to which are attached some of the pleasantest recollections of our tour, we saw the remains of a noble forest, which some 20 years ago had been cut down and converted into railway sleepers. The sight of the huge stumps, blackened by time, with their gnarled roots twisting themselves over the ground, gave us the idea of some vast charnel-house. This scene of utter ruin was indeed a sad spectacle, though the present proprietor is doing his best to again cover his estate with timber ; with a better system he might have been spared both time and expense. It is easy in Scotland to perpetuate a forest by natural means, and of this a practical proof was given us in two forests which we visited ; the one near Grantown, in Strathspey, the other at Beauly. In these the results obtained under the skilful and intelligent direction of the gentlemen who manage these forests for their employers form a striking example of what may be done in the way of reproducing forests by natural means. In fact, nothing had been neglected which even the most critical forester could desire ; the gradation of age was here complete, and the reservation of specially vigorous trees, of known pedigree, duly carried out.

The *modus operandi* here pursued consists simply in the exclusion of the sheep and deer, in the judicious thinning out of the growing crop, and in the removal of the mature seed-bearing trees, by successive fellings, as the young forest grows up and acquires more vigour.

Nevertheless, we would not have it be supposed that the sheep need be absolutely debarred from all grazing in the forest ; it is only in those portions where the undergrowth is very young that the damage caused is irreparable. We feel convinced that if, every year, certain portions of the forest best capable of supporting it were marked out for grazing, the quality of the pasture would be greatly improved, and the heather would quickly disappear under the cover.

It is an established fact, beyond all contradiction, that on any soil, whatever its geological origin, a complete covering of forest vegetation will kill the heather as soon as the trees reach the age of between 30 and 40 years. Suppose then that 120 years be the term fixed for the existence of the trees in any portion of the forest, and that the trees of 100 years of age and over are reserved, there would still be one-half of the forest always open to the sheep, and the other closed. But, at the same time, it is certain that this open half, owing to its superior quality, will furnish pasturage for at least twice as many head of cattle or sheep as the same quantity of moorland.

Although, under ordinary conditions, the generation of a forest will be sufficiently assured by the exercise of a discreet control over the grazing, something more than this must be done if is desired to turn the land to the best possible account. It is, therefore, a matter of regret that nothing has yet been done to place forest management in Scotland on a sound economic basis.

The productive powers of the soil and of the climate have been made use of by able and intelligent planters, who have thereby enabled nature herself to accumulate a considerable store of timber ; but all this wealth is exposed to the carelessness of some and to the ignorance of others, until the hand of a forester manages it properly and places it on the only sound economic principle of all agricultural and forest property,—*a constant annual revenue and a constant improvement in production.*